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ABSTRACT

This report for 1977 is the third in a series of annual reports prepared by the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel in a continuing study. Discussed are the current status of the labor market and the near-term outlook for research personnel in the four broad areas into which the study is organized: basic biomedical sciences, behavioral sciences, clinical sciences, and health services research. Research training needs and issues in nursing research are covered for the first time. Specific recommendations are made about the numbers of individuals to be supported by the research training programs of the National Institutes of Health, the Alcohol, Drug Abuse and Mental Health Administration, and the Health Resources Administration. Firm recommendations are made for fiscal year (FY) 1979 and tentative goals for FY 1980-81. Of special interest are the results of a survey of a sample of 14,300 of the country's younger biomedical and behavioral scientists, a discussion of the situation of minorities and women in the biomedical and behavioral sciences, and recommendations for some of the policies and administrative aspects of the National Research Service Award Act program. (MSE)

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Personnel Needs and Training for Biomedical and Behavioral Research

Volume 1

1977 Report

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HE009596

Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel

Commission on Human Resources

PERSONNEL NEEDS AND TRAINING
FOR BIOMEDICAL AND BEHAVIORAL RESEARCH

THE 1977 REPORT

of the

COMMITTEE ON A STUDY OF NATIONAL NEEDS
FOR BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

COMMISSION ON HUMAN RESOURCES

NATIONAL RESEARCH COUNCIL

Volume 1

National Academy of Sciences
Washington, D.C.
1977

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NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the Committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

The work on which this publication is based was performed pursuant to Contract No. N01-OD-5-2109 with the National Institutes of Health of the Department of Health, Education, and Welfare.

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OFFICE OF THE PRESIDENT
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

September 30, 1977

The Honorable Joseph Califano
Secretary of Health, Education, and Welfare
Washington, D. C. 20201

My dear Mr. Secretary:

It is a pleasure to present to the Department of Health, Education, and Welfare the 1977 report of the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel. This is the third annual report in the continuing study undertaken by the National Research Council pursuant to Title I of the National Research Act of 1974 (PL 93-348). The work has been supported under Contract NO1 OD 5 2109 with the National Institutes of Health.

The Act states (Section 473 (a)) that the purposes of the study are to: "(1) establish (A) the Nation's overall need for biomedical and behavioral research personnel, (B) the subject areas in which such personnel are needed and the number of such personnel needed in each such area, and (C) the kinds and extent of training which should be provided such personnel; (2) assess (A) current training programs available for the training of biomedical and behavioral research personnel which are conducted under this Act at or through institutes under the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration, and (B) other current training programs available for the training of such personnel; (3) identify the kinds of research positions available to and held by individuals completing such programs; (4) determine, to the extent feasible, whether the programs referred to in clause (B) of paragraph (2) would be adequate to meet the needs established under pragraph (1) if the programs referred to in clause (A) of paragraph (2) were terminated; and (5) determine what modifications in the programs referred to in paragraph (2) are required to meet the needs established under paragraph (1)."

In the sixteen months since the submission of the 1976 report, the Committee has made substantial progress in responding to the goals of the Act. Through the conduct of new surveys, it has significantly expanded the data on which estimates of labor market conditions and planning needs are based. In addition, the Committee has, as it was asked to do, addressed training needs in the areas of health services research and nursing research. In the year ahead, the Committee will seek further improvement in its ability to assist HEW and the Congress in meeting the Nation's training needs.

We hope the present report will be helpful and shall be glad to discuss it with you and your staff.

Sincerely yours,

P Handler

Philip Handler
President

Enclosure

PREFACE

This report for 1977 is the third in a series of annual reports prepared by the Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel in a continuing study that was established pursuant to the provisions of the National Research Service Award Act of 1974 (Public Law 93-348). In this report, the Committee discusses the current status of the labor market and the near-term outlook for research personnel in the four broad areas into which the study has been organized--basic biomedical sciences, behavioral sciences, clinical sciences and health services research. In accordance with the provisions of the Health Research and Health Services Amendments of 1976, which extended the authority of the Act, the Committee this year for the first time reports upon research training needs and issues in nursing research.

The Committee has again made specific recommendations about the numbers of individuals to be supported by the research training programs of the National Institutes of Health, the Alcohol, Drug Abuse, and Mental Health Administration, and the Health Resources Administration. Recommendations also speak to the division of support between predoctoral and postdoctoral training.

The Committee makes firm recommendations for FY 1979 and sets tentative goals for FY 1980-81. An explanation of the omission of recommendations for 1978 is required. The Committee last year set tentative goals for FY 1978 with the expectation that they would be reviewed and revised in this current report. However, subsequent amendments to the Act changed the Committee's reporting date from March 31 to September 30. Since recommendations made on the last day of the current fiscal year would come too late to affect the awards to be made in FY 1978, the Committee was forced to let its earlier (and tentative) recommendations for 1978 stand.

The timing of the Committee's 1976 report relative to the Congressional appropriation process and to the agencies' awarding process created some operational difficulties. That report was transmitted in May 1976, when only a month remained in the fiscal year. Hence there was insufficient time for the agencies to respond to the Committee's recommendations for FY 1976. Timing problems should have been somewhat less serious relative to the FY 1977 recommendations made in last year's report, and should become even less so with those made for FY 1978. As this year's recommendations cover FY 1979-81, it is unlikely that there will be a problem of coordinating the recommendations with the appropriation and awarding process. The Committee will continue to review and revise its recommendations when necessary.

Of special interest in the 1977 report are the results of a survey of a sample of 14,300 of the country's younger biomedical and behavioral scientists; a discussion of the situation of minorities and women in the biomedical and behavioral sciences; and recommendations which address some of the policies and administrative aspects of the National Research Service Award Act program.

The current report has been organized into two volumes. Volume 1, the report proper, contains summaries of all findings and analyses and the statement and discussion of each of the Committee's recommendations. Volume 2, the appendixes, is comprised of (1) tabular data which will be of interest primarily to those who desire to study in detail the results of the Committee's survey, and (2) data supplied to the Committee by the agencies concerning their programs for 1975 and 1976. The reader who desires only to know the direction, underlying rationale, and specifics of the Committee's recommendations need not read Volume 2.

Volume 1 contains 10 chapters. Chapter 1 begins with the objectives the Committee had in developing the 1977 report. It then reviews the new area of nursing research, the public meeting which the Committee held in November 1976, and two special surveys the Committee conducted this year. Finally, a summary is given of the Committee's numerical recommendations for FY 1979, and its tentative recommendations for FY 1980-81.

Chapter 2 presents the Committee's approach to determining the need for biomedical and behavioral research personnel, as well as the economic and noneconomic forces which affect the market for such personnel. Then it discusses the complex issues related to taxonomy and classification as these continue to pose serious obstacles to providing satisfactory answers to the questions the Committee is investigating.

Chapters 3 through 7 provide detailed treatment of the Committee's findings and recommendations in the areas of basic biomedical sciences, behavioral sciences, clinical sciences, health services research, and nursing research, respectively. It is in these chapters that the results of the Committee's survey of recent doctorate recipients will be found, as well as numerous recommendations on specific issues related to these particular areas.

Chapter 8 gives an overview of graduate education and employment of minorities and women in the biomedical and behavioral sciences. In Chapter 9 the Committee offers a series of recommendations on general policy and administrative issues, based on its experience with the program. Finally, Chapter 10 looks to the future directions of the study and to some of the questions that call for further investigation.

With the recent passage of Public Law 95-83--the Biomedical Research Extension Act of 1977--the authority of the legislation has been extended through September 30, 1978. The Committee is pleased to be of service and will continue its analysis of these important federal training programs as long as such study serves a useful purpose.

Robert J. Glaser, M.D.
Chairman

Henry W. Riecken, Ph.D.
Vice Chairman

ACKNOWLEDGMENTS

This report has benefited from the efforts and cooperation of many people and organizations. The Committee is particularly grateful to the chairmen and members of its five panels for the time they devoted to their deliberations and for their intensive efforts in compiling information, interpreting findings, providing advice, and formulating recommendations for the Committee's consideration.

Several federal agencies interested in this study supplied helpful advice and assistance. Financial support was provided by the National Institutes of Health. Donald S. Fredrickson, Director of the National Institutes of Health, James D. Isbister, former administrator of the Alcohol, Drug Abuse, and Mental Health Administration, and Kenneth Endicott, former Administrator of the Health Resources Administration, met with the Committee early in the last fiscal year and presented their views on the training programs. William H. Batchelor served as project officer for the National Institutes of Health and maintained excellent liaison with the Committee. Also at the National Institutes of Health, Joseph A. Brackett, Charles W. Casey, Carl D. Douglass, Helen H. Gee, Nicholas C. Moriarty Jr., Charles A. Miller, Vincent E. Price, Solomon Schneyer, Charles N. Shea, and Herbert B. Woolley made available background information and data and provided other assistance. David F. Kefauver and Michele W. Harvey of the Alcohol, Drug Abuse, and Mental Health Administration and Susan R. Gortner and Marie J. Bourgeoise in the Division of Nursing of the Health Resources Administration, provided liaison with their organizations and were helpful in many ways. Gerald Rosenthal and Jean Carmody of the National Center for Health Services Research, Health Resources Administration, provided information regarding their training programs in the area of health services research.

Richard P. Eisinger of the Office of Management and Budget assisted in the development of the survey questionnaires. At the National Science Foundation Penny Foster and Susan Broyles helped to coordinate the surveys with those of the Foundation, and Charles H. Dickens provided administrative assistance.

A special paper prepared by Jerry Miner, a member of the Data and Studies Panel, was incorporated in Chapter 2. Joan Snyder, serving as a consultant, contributed importantly to the study of minorities and women reported in Chapter 8.

Within the Commission on Human Resources, Robert A. Alberty, Chairman of the Commission, and William C. Kelly, its Executive Director, offered counsel and assistance in all phases of the study.

The Committee's staff, under the direction of Herbert B. Pahl, supported the Committee and panels by conducting the surveys and other data collection activities, performing the

analyses, and preparing reports of the findings. Allen M. Singer supervised the collection of data from the agencies and performed the analyses leading to the projections of academic demand in the basic biomedical, behavioral, and clinical sciences area. Porter E. Coggeshall had primary responsibility for conducting the Survey of Biomedical and Behavioral Scientists, analyzing the results and reporting the findings. Pamela Ebert-Flattau coordinated the data collection and analyses in the areas of behavioral sciences, health services research, and nursing research. John C. Norvell and Samuel S. Herman served as executive secretaries to the Basic Biomedical and Clinical Sciences Panels respectively and supervised the staff support of those panels' activities. Robert G. Snyder had primary responsibility for conducting the Survey of Department Chairmen. Lindsey R. Harmon served as a consultant on the survey design and analyses.

The Committee enjoyed excellent administrative, technical, and clerical support. Kay C. Harris handled the administration, J. Richard Albert, Prudence W. Brown, Corazon M. Francisco, David Y. Pee, and Rebecca C. Stuart performed the technical tasks, and Marie A. Clark, Llyn M. Ellison, Danita L. Gareri, Regina C. Jacobs, and Sharon A. Sanford supplied expert secretarial services.

To all of these persons and organizations, the Committee expresses its warmest thanks.

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ABBREVIATIONS

AAMC	Association of American Medical Colleges
ADAMHA	Alcohol, Drug Abuse, and Mental Health Administration
AMA	American Medical Association
BLS	Bureau of Labor Statistics, Department of Labor
CHR	Commission on Human Resources (NRC)
DRF	Doctorate Records File, Survey of Earned Doctorates
DRG	Division of Research Grants (NIH)
DRR	Division of Research Resources (NIH)
FTE	Full-Time Equivalent
FY	Fiscal Year
GNP	Gross National Product
HEW	Department of Health, Education, and Welfare
HRA	Health Resources Administration
IOM	Institute of Medicine
IRS	Internal Revenue Service
NAS	National Academy of Sciences
NCHSR	National Center for Health Services Research (HRA)
NCI	National Cancer Institute (NIH)
NEI	National Eye Institute (NIH)
NHLI	National Heart and Lung Institute (NIH)
NIA	National Institute of Aging (NIH)
NIAAA	National Institute of Alcoholism and Alcohol Abuse (ADAMHA)
NIAID	National Institute of Allergy and Infectious Diseases (NIH)
NIAMDD	National Institute of Arthritis, Metabolism, and Digestive Diseases (NIH)
NICHD	National Institute of Child Health and Human Development (NIH)
NIDA	National Institute of Drug Abuse (ADAMHA)
NIDR	National Institute of Dental Research (NIH)
NIEHS	National Institute of Environmental Health Sciences (NIH)
NIGMS	National Institute of General Medical Sciences (NIH)
NIH	National Institutes of Health
NIMH	National Institute of Mental Health (ADAMHA)
NINCDS	National Institute of Neurological and Communicative Disorders and Stroke (NIH)
NLM	National Library of Medicine (NIH)
NRC	National Research Council
NRSA	National Research Service Award
NSF	National Science Foundation
OMB	Office of Management and Budget
PHS	Public Health Service
PSAC	President's Science Advisory Committee
R and D	Research and Development

GLOSSARY

Area--One of the five broad areas of training designated by the Committee as being within the purview of this study: (1) basic biomedical sciences, (2) behavioral sciences, (3) clinical sciences, (4) health services research, and (5) nursing research (cf. *Field*). A discussion or listing of the fields comprising these areas follows:

Basic Biomedical Sciences--also referred to as biomedical sciences. See Table 2.3 (Chapter 2) for a listing of fields included in this area. This area should not be confused with the designation *biological sciences*, which includes a broader set of fields (e.g., botany, ecology, and entomology), or *life sciences*, which includes all agricultural, biological, and clinical fields.

Behavioral Sciences--see Table 2.3 (Chapter 2) for a listing of fields included in this area. This area should not be confused with the designation *social sciences*, which includes a broader set of fields (e.g., political science and economics).

Clinical Sciences--the following is a list of component training fields:

- Dentistry
- Medicine and surgery
  - Allergy
  - Anesthesiology
  - Geriatrics
  - Internal medicine
    - Cardiovascular diseases
    - Clinical nutrition
    - Connective tissue diseases
    - Dermatology/syphilology
    - Diabetes
    - Endocrinology
    - Gastroenterology
    - Hematology
    - Infectious diseases
    - Liver diseases
    - Metabolic diseases
    - Nuclear medicine
    - Oncology
    - Pulmonary diseases
    - Renal diseases
    - Tropical medicine
    - Internal medicine, other
  - Neurology
  - Neuropsychiatry
  - Obstetrics/gynecology
  - Ophthalmology/optometry
  - Otorhinolaryngology
  - Pediatrics
  - Preventive medicine
  - Psychiatry
  - Radiology
  - Surgery
- Veterinary medicine
- Clinical sciences, other

Health Services Research--see Chapter 6 for a discussion of component fields.

Nursing Research--see Chapter 7 for a discussion of component fields.

Award--In the present and previous Committee reports this term refers to the granting of a fellowship to an individual or, in the case of a training grant, to a training position made available on the grant. It is usual in the latter case for a single training grant to provide for several training positions.

Center--National Center for Health Services Research (NCHSR) of the Health Resources Administration (HRA).

Clinical Investigator--a medical scientist with a professional or academic doctorate doing research in the clinical sciences. Also, clinical scientist.

Committee--Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel.

Committee Survey:

Committee Survey of Recent Doctorate Recipients--Survey of Biomedical and Behavioral Scientists conducted by the Committee and the National Research Council (NRC), 1976.
Committee Department Survey--Survey of Biomedical and Behavioral Science Departments conducted by the Committee and the NRC, 1977.

Doctorate Recipients:

Academic--received Ph.D. or equivalent degree.
Professional--received M.D., D.D.S., D.V.M., or other health professional doctorate.

Enrichment--displacement within the labor force of less-highly-trained personnel (with M.A./M.S. or lower-level degrees) by individuals with doctorate degrees.

Field--the training or employment specialties within each of the broad areas (cf. *Area*).

Field-Switching--the movement of individuals between and within fields of training and fields of employment.

Labor Force--includes persons employed in positions other than postdoctoral appointments, as well as unemployed persons who are seeking employment.

Medical Scientist Training Program--broad, institutionally based programs, sponsored by NIH, designed to assist universities and their medical schools in providing selected trainees with the essential scientific medical background needed for a career as a medical scientist, generally leading to a combined M.D./Ph.D. degree.

National Institutes of Health (NIH); Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA); Health Resources Administration (HRA)--federal agencies of the Public Health Service (PHS), Department of Health, Education, and Welfare (HEW), that provide the primary sources of support for biomedical and behavioral research and research training. The largest agencies, NIH and ADAMHA, are organized into bureaus and institutes that pursue various health problems.

National Research Service Award Act (NRSA Act, PL 93-348, 1974)--the Act under which this study is undertaken. It charges the Committee with investigating the nation's training needs in the biomedical and behavioral sciences. For sections of the Act pertinent to this study, see Supplement 2.

Panel--refers to any of four specifically cited disciplinary panels associated with this study--Basic Biomedical Sciences, Behavioral Sciences, Clinical Sciences, or Health Services Research--or to the Data and Studies Panel, which provides advice and analytical support to the disciplinary panels and to the Committee.

Report--one of the annual reports issued by the Committee.

Survey of Doctorate Recipients--NRC bienniel survey of Ph.D. scientists currently active in the U.S. labor force. Data include information on 1972-75 employment.

Survey of Earned Doctorates--NRC annual survey of persons earning Ph.D. or equivalent degrees in all areas. Survey data include information about graduate training and postgraduation employment plans.

Training Levels:

Predoctoral--study in a graduate program by pre-Ph.D. students and by pre-M.D.'s who are engaged in full-time research training for a complete academic year. Beyond what is normally considered graduate education, predoctoral training, as used in this report, also includes clinical science training in the Medical Science Training Program, often leading to a combined M.D./Ph.D. degree.

Postdoctoral--specialized research training taking place after receipt of a Ph.D. or health profession degree.

Post-Ph.D.--specialized research training taking place after receipt of a Ph.D. degree.

Postprofessional--research training taking place after receipt of a medical, dental, veterinary, or other health professional doctorate.

Training Mechanisms:

Fellowship--awards made directly to the individual, largely in the form of a stipend, from a variety of sources, such as the federal government, voluntary health organizations, foundations, and universities; may include an institutional subvention; PHS fellowships are awarded to individuals at particular institutions.

Training Grant--awarded to nonprofit private or nonfederal public institutions through peer review competition, generally for five-year renewable periods; in addition to student support, includes institutional program support for maintenance of the training environment.

Research Assistantship--graduate student support obtained through a research grant or contract to a faculty member; research associateships are similar awards at the postdoctoral level.

Teaching Assistantship--graduate student support provided for teaching services; not specifically designed for research training.

Self/Private Support--graduate student support derived from personal resources, including work, loans, and spouse and/or family.

Transition Quarter--the three-month period, July 1, 1976, to September 30, 1976, that comprised the one-time shift in the start of the fiscal year from July 1 to October 1.

1. INTRODUCTION AND SUMMARY OF NUMERICAL RECOMMENDATIONS, FISCAL YEARS 1979-81

This is the third in a series of annual reports that the Committee has prepared in response to the request of the Congress under the National Research Service Award Act of 1974 (NRSA) "to assess the national needs for biomedical and behavioral research personnel" and to "recommend the kinds and extent of training to be provided" under federal programs.

In its second annual report (National Research Council, 1976a), the Committee provided a brief "Historical Overview," which reviewed both the federal interests and involvement in biomedical and behavioral research and the specific charges that the Congress established for a continuing study of research personnel needs in these fields. That overview, together with the Act and a summary of several important related questions that emerge from the legislative history of the NRSA Act, are reproduced in Supplements 1-3 at the end of this volume. These and the synopsis given in Supplement 4 of the major findings and recommendations of the 1976 report place the present report and its recommendations in perspective.

For purposes of carrying out its responsibilities in its second annual report (1976), the Committee divided the biomedical and behavioral sciences into four broad areas--basic biomedical sciences, behavioral sciences, clinical sciences, and health services research. The Committee made a number of recommendations for adjustments in the number of predoctoral and postdoctoral awards for research training under the programs of the National Institutes of Health (NIH) and the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) in each of these four areas for fiscal years (FY) 1976, 1977, and 1978. In that report the Committee set target goals for FY 1976, realizing that they would come too late for the funding agencies to be able to make major changes toward implementation. The first specific recommendations made by the Committee, which permitted the agencies sufficient time for implementation, were made for FY 1977; these are summarized in Supplement 4.

OBJECTIVES OF THE 1977 REPORT

The objectives for the current report are to (1) review, update, and extend the Committee's specific previous recommendations about the numbers of predoctorals and postdoctorals who should receive federal support within each of the broad areas into which the biomedical and behavioral sciences have been divided; (2) make recommendations concerning appropriate usage of the different support mechanisms for each of these areas; (3) specify, where possible, the subject matter or training fields that the Committee believes deserve special emphasis at this time; (4) assess the current training programs of the agencies covered by NRSA, including for the first time the nursing research program of the Health Resources Administration (HRA), which was brought within the scope of the NRSA legislation when the Act was amended in 1976; (5) identify the kinds of research positions that are available to and held by recent graduates of federally supported training programs; and (6) propose modifications in the administration of the NRSA program in order to achieve its objectives more fully.

Beyond these primary objectives, the Committee this year undertook a study of career patterns of biomedical and behavioral research personnel. This report summarizes data on the post-training activities of both former trainees and former fellows from federally supported predoctoral and postdoctoral programs and of those not so supported (Chapters 3 and 4).

The Committee also begins to address the issues of whether there are alternatives to federal support programs available to students planning research careers in these fields, and whether there are more appropriate and effective alternatives to the training grant and fellowship mechanisms. Because the studies relating to these issues have not been completed, the results will be reported next year (see Chapter 10, "Federal Support and Training Quality").

Two other areas of responsibility manifested in the legislative history of NRSA are touched upon by the Committee this year, but not explored in depth. One is the question of whether the federal government provides disproportionate support for training in the biomedical and behavioral sciences than in other areas in relation to the government's overall investment in research in those areas. The Committee has included some readily available data pertinent to this topic (Supplement 7). The second issue is whether the net rate of return to individuals trained in certain fields that are heavily supported by ADAMHA, HRA, or NIH is of such a magnitude as to make it reasonable to require them to bear the costs of their own training. This matter is left for future consideration except for citations to some recent studies (Scheffler, 1977).

In summary, the Committee's report this year addresses a number of the points within its legislative charge, and, for the first time, presents data about the underlying issue of training and career patterns that, although not explicitly included in the statute, emerged during the legislative debate about the NRSA Act.

NURSING RESEARCH

In the spring of 1976 the Congress passed the Health Research and Health Services Amendments of 1976, Title II of which extended the NRSA authority to include the research training programs of the Division of Nursing of the HRA. The Committee responded to this Congressional action by appointing nurse investigators as members of three of its five advisory panels (Behavioral Sciences, Clinical Sciences, and Health Services Research), and by establishing nursing research as a fifth broad area for study by the Committee. The current report thus presents for the first time a discussion of and specific recommendations for advanced training in the area of nursing research (Chapter 7).

SOLICITATION OF VIEWS FROM THE PUBLIC

Prior to the issuance in May 1976 of the second annual report, the Committee both formally and informally had invited the viewpoints of others with regard to the issues posed by the legislation and how best to conduct the continuing study so as to accomplish the several tasks set for it. Many useful comments were received, but the number of persons having opportunity to comment was small. As a result of the heightened interest in the work of the Committee that arose after the wide distribution of the 1976 report, the Committee decided to solicit reactions and comments from a broader public on a more formal basis. Accordingly, a public hearing was held for this purpose on November 4, 1976, in Washington, D.C., at the National Academy of Sciences (NAS), approximately four months after the Committee's 1976 report had become generally available (Supplement 5).

The purpose of this hearing was to receive the views of representatives of professional societies, academic institutions, lay organizations, and individual citizens as the Committee proceeded to work toward its 1977 report. The Committee requested criticism of any aspect of its 1976 report. The Committee specifically solicited any quantitative evidence that would help verify or refute the array of anecdotal information that always surfaces when manpower issues are discussed. In addition, the Committee sought suggestions for improving its procedures and performance in carrying out its responsibilities.

During a full day and evening session, the Committee heard from 36 scheduled speakers and an additional 16 persons who presented brief statements from the floor during open discussion periods. The points raised and opinions offered touched on virtually every major topic either addressed in the 1976 report or planned for inclusion in future reports. These included access by minorities and women to research training opportunities, the importance of distinguishing the research training needs for behavioral scientists from those for health services research, the specificity with which numerical recommendations for research training levels should be made by the Committee, the significance of multidisciplinary training programs, the training needs in the emerging areas of nursing research and health services research, the impact that new health legislation frequently has upon manpower needs, problems related to the NRSA payback provision, the emphasis given to a number of specific fields, and the division of fields among the Committee's disciplinary panels.

All documents submitted to the Committee in connection with the public hearing have been reviewed by the appropriate advisory panels and the Committee and are a part of a file available to the public. The viewpoints and recommendations expressed have assisted the Committee in reaching its conclusions on various policy issues.

As noted in Chapters 3-8, representations were made at the hearing on the need for additional training of research personnel in a number of selected fields. However, the quantitative evidence produced at and subsequent to the hearing was insufficient to support specific proposals.

In this report the Committee has not attempted specifically to address each individual's views as expressed at the hearing. Rather, the Committee and its advisory panels have reviewed the opinions presented there and have attempted to take them into account in making their findings and recommendations. The influence of the hearing was most clearly shown in the Committee's special efforts to study the needs for increased opportunities for women and minorities, to clarify the relationships between the training of behavioral scientists and that of health services researchers, to review whether emphasis should be given to particular fields identified for priority consideration by various participants, and to assure that all fields are given adequate review by one or more of the appropriate disciplinary panels.

REVIEW OF CURRENT STUDIES

The issues that the Committee has been asked to consider cannot adequately be addressed from data that heretofore have been available. Consequently, the Committee conducted three special nationwide surveys in order to obtain needed data. One questionnaire collected information from individual investigators in the biomedical and behavioral sciences, another from university departments in the biomedical and behavioral sciences in which all predoctoral training and most of the postdoctoral training is provided, and a third from personnel who had received federal support for graduate training in health services research. Also, a study was conducted by the Association of American Medical Colleges (AAMC) on the research training of M.D.'s in medical centers and teaching hospitals.

These three studies provided extensive information that added significantly to the data previously available to the Committee from national survey data files maintained by the National Research Council (NRC, 1958-76). In addition, specialized program data were provided by the federal agencies that administer the NRSA program (ADAMHA, HRA, and NIH). Other data from the National Science Foundation (NSF, 1972-75) and nonfederal organizations, including the American Medical Association (AMA) and AAMC, also were very helpful to the Committee and panels.

The Committee also reviewed and analyzed three other sources of information: (1) the comprehensive study by Cartter (1976) on the projected supply of scientists and the future demand for them within the academic sector, (2) the results of a special study conducted for the Committee by Freeman (1977) on the development of manpower models in the biomedical sciences and psychology, and (3) an ongoing market study sponsored by NIH that uses periodic surveys to assess the current supply and demand for biomedical and clinical investigators in both academic and nonacademic employment settings (Westat, Inc., 1977).

Together, these surveys and studies have provided the Committee with a much broader base of information upon which to develop the present recommendations than previously has been available. Because of the scope and pertinence of the three national questionnaire surveys developed by the Committee, a brief overview of each is provided below.

Survey of Recent Doctorate Recipients, 1971-75

The purpose of this survey was to collect current information on the training and subsequent work activities of recent Ph.D. recipients in biomedical and behavioral fields. This information is valuable in determining the impact that declining market conditions may have had in these fields. Of particular interest were data on the number of graduates taking postdoctorals and the extent to which these appointments had been prolonged because of difficulty in finding employment. From the survey findings the Committee also hoped to be able to differentiate among the employment opportunities for graduates in particular biomedical and behavioral fields. Findings from this survey are reported in Chapters 3 and 4.

Special efforts were made to survey nurses who had earned doctorates between 1971 and 1975. Many of these individuals received degrees in fields other than the biomedical and behavioral sciences (e.g., education). Survey results for this group are reported in Chapter 7.

Survey of Biomedical and Behavioral Science Departments

While much is known about the demographic characteristics of trainees and training programs, little firm data are available about the role and impact of federal training support on academic departments. For example, the NSF's annual departmental survey of graduate science student support and postdoctorals is not sufficiently disaggregated to provide the detailed information about individual agencies and types of support (fellowships and traineeships) needed by the Committee. Therefore, a questionnaire survey was undertaken to obtain objective data about the academic department as a training environment and about the pattern of funding for pre- and postdoctoral trainees. The survey also inquired about sources of nonfederal funding in order to estimate the possible impact of the loss of training grant support on departments. Among other issues examined were (1) recent trends in graduate enrollments and postdoctorals, (2) substitutability of alternative sources of support for loss of training grant support, and (3) importance of training grants for supporting high-quality training. In addition, information was solicited on departmental perceptions of the current job market, anticipated future faculty needs, the possible lengthening of the postdoctoral training period, and the impact of a worsening job market.

Although some preliminary findings are available to the Committee, the task of making a complete analysis of the survey's results for publication could not be completed in time to be included in this year's report. The Committee expects to continue analysis of the data and include it in the 1978 report.

Survey of Health Services Research Personnel

The Committee has found it difficult to assess the current supply of health services research personnel because an adequate data base does not exist in this recently established area. In order to make a start toward constructing such a data base, the Committee conducted a survey of personnel in health services research whose training had been federally supported (Chapter 6). The survey provided information about training and current employment experiences. While it is clear that the persons surveyed do not constitute a sample from which results can be generalized to the population of health services research workers, the Committee believes that these findings are an important first step toward a substantive analysis of needs in this area.

OVERALL RECOMMENDATIONS FOR FEDERAL SUPPORT

In the following sections the Committee presents (1) its views and recommendations with regard to the two program mechanisms by which the agencies provide support for research training, and (2) a discussion of the basis for and a summary of its numerical recommendations for FY 1979-81 for each of the four broad areas into which the study has been divided. Additional recommendations concerning selected policy issues and the administration of the NRSA program will be found in Chapter 8 and Chapter 9.

Mechanisms of Support

As the major supporter of health-related biomedical and behavioral science research, the federal government has sought to promote excellence in research through high-quality training. In its 1976 report, the Committee pointed out that historically one goal of NIH/ADAMHA training policy has been to increase the number of researchers; "another was to bolster the quality of training programs and to ensure that training was available in areas of national interest."

To this end, NIH and ADAMHA have followed two complementary paths in fostering research training--individual support of high-quality students through fellowships, and the underwriting of superior training programs through training grants. These paths converge. Where quality training is conducted, the programs attract and select top-quality students who, by their presence, strengthen the programs designed to train them. The focus of training support, therefore, has been the department or program, directly through a training grant or indirectly through an individual fellowship.

The Administration's proposed termination of the NIH and ADAMHA research training grant programs in FY 1978 is the latest in a series of such actions in recent years to limit support for predoctoral and postdoctoral research training to fellowships only. The Congress has not accepted this position and has maintained the training programs. The Committee reaffirms the wisdom of Congress in maintaining this tradition of federal support for high-quality research training.

Within the context of the overall excellence of federal training programs, there has been continuing debate over the relative merits of training grants as compared with fellowships. This debate is one of the reasons Congress requested the study that this Committee undertook under the provisions of the NRSA Act of 1974. Critics of the training grant approach argue that such grants allow a limited number of universities to recruit students and expand faculty to the disadvantage of institutions that do not have training grants. These critics also say that training grants limit students' freedom of choice, whereas an individual fellowship, awarded on the basis of personal excellence and scientific promise, allows the student to choose the training environment best suited to his or her needs and promotes a healthy competition among institutions.

On the other side, critics of the individual fellowship argue that, at the predoctoral level at least, students' interests are likely to be so unformed, and their knowledge of training opportunities so limited, that they cannot make truly informed choices. These critics contend that it is expensive to administer individual fellowship competitions on a nationwide basis, and the balancing of awardees' institutional preferences against available places is a cumbersome and slow process. They also point out that complete reliance upon individual fellowships could lead to erratic and unpredictable fluctuations in enrollment pressures at individual institutions, which would have a destabilizing effect upon the training environment and would limit ability to plan sound programs.

The Committee has considered these and other arguments carefully and at length. On balance, it is persuaded that both fellowships and training grants are needed in an effective national research training program and that each has a role to play. Because the needs and problems of research training differ among the various scientific areas with which the Committee is concerned, recommendations about the appropriate means and magnitude of support must be particular to the area and level of training involved.

One aspect of this matter seems so significant that it deserves special comment. The Committee strongly holds to the view that the training grant approach should not be suddenly abandoned or drastically altered, as the training capabilities of university departments are not quickly or cheaply reconstituted. Dismantlement of the training grant program could well impair the ability of some of the nation's leading educational institutions to train high-quality researchers for productive careers in the biomedical and behavioral science areas.

Recommendation. The Committee recommends that, while caution and a differential approach are called for, the federal government should continue to support and maintain both training grant and fellowship programs in the biomedical and behavioral sciences. More specific recommendations for each of the broad areas is reported upon in the following chapters.

Basis for Committee's Numerical Recommendations

The numerical recommendations made in the present report are derived in large measure from the much greater data base now available to the Committee. Interpretations of the data have been discussed and tested against the informed judgment of the Committee, with the close advice and cooperation of the panels and the staff. Particular attention has been paid to assessing the quality implication of each suggested recommendation or position in terms of the Committee's conclusion, stated in the 1976 report, that "in adjusting public policy to reflect changing market conditions, federal policy should seek to sustain and enhance this tradition of high quality training."

The Committee's judgments about the nation's need for biomedical and behavioral manpower are intimately and necessarily linked to its forecast for the level of research support. Admittedly, this forecast is uncertain, and we make it with hesitation, but make it we must. The Committee's view is that the amount of support for biomedical and behavioral research is likely to continue at about its current level (with some allowance for inflation) in the next few years. Should the level of support change greatly, either increasing or decreasing, personnel needs would be correspondingly affected.

As to the appropriateness of the current level of support, the Committee takes no position, for it has not studied this question, and indeed believes that it falls outside the Committee's charge. Nevertheless, the Committee notes that many individuals and groups familiar with the situation believe that the level of research support is currently inadequate. For instance, the President's Biomedical Research Panel recommended a substantial increase in national expenditures on health-related R and D. Secondly, many scientists see enormous potential for basic and applied research on unsolved problems. Thirdly, it has been pointed out that the R and D expenditures in health and medicine are now no more than 3 percent of the health care expenditures, whereas it is not unusual for knowledge-based industries (such as medicine, aerospace, pharmaceuticals) to spend 8-12 percent of their operating budget on R and D. Others might contend that the current level of R and D is adequate. Whatever the appropriateness of the current level, the Committee must act on the basis of its estimate of what is likely to happen rather than on what should be the case. On balance, the Committee believes that in constant dollars the steady state will continue in the short run.

Summary Tables of Numerical Recommendations

In its report last year, the Committee made specific numerical recommendations for FY 1977 and set tentative goals for FY 1978 for each broad area. At that time it was intended to review during this past year the FY 1978 goals and to make specific recommendations for FY 1978 in the present report. However, with the passage of the Health Research and Health Services Amendments of 1976, the date for the submission of this and future annual reports was advanced from March 31 to September 30. The net effect of this change, together with the change in the starting date for the federal fiscal year from July 1 to October 1, which was made last year, would have made it impractical to make recommendations for FY 1978, as they would be too late.

In the report this year, therefore, recommendations are made for FY 1979, 1980, and 1981 for predoctoral and postdoctoral traineeships and fellowships. The recommendations for FY 1979 are considered firm, whereas those for FY 1980-81 should be considered as tentative goals that the Committee will review during the coming year and discuss in its 1978 report.

In Chapters 3 through 7 the Committee presents its findings and specific recommendations covering each of the five aggregate areas into which this study is divided. However, for the convenience of the reader, a background information table and a set of tables that summarize the recommendations for all five areas have been provided: (1) Table 1.1 shows the number of NIH and ADAMHA trainee and fellowship awards made in FY 1975-76 (including the transition quarter, July 1, 1976 - September 30, 1976, which occurred in 1976 when the start of the federal fiscal year was advanced from July 1 to September 30; (2) Tables 1.2 and 1.3 give Committee recommendations for numbers and

TABLE 1.1 NIH and ADAMHA Trainee (T) and Fellowship (F) Awards for FY 1975 and 1976 including the Transition Quarter[a] (number of full-time equivalent positions)

		Total			Basic Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research		
		Total	T	F	Total	T	F	Total	T	F	Total	T	F	Total	T	F
FY 1975																
GRAND TOTAL NIH and ADAMHA	Total	14,443	11,955	2,488	9,199	7,607	1,592	1,966	1,657	309	3,095	2,541	554	183	150	33
	Pre	8,432	8,052	380	6,003	5,826	177	1,754	1,569	185	543	543	0	132	114	18
	Post	6,011	3,903	2,108	3,196	1,781	1,415	212	88	124	2,552	1,998	554	51	36	15
Total NIH	Total	12,384	10,465	1,919	8,598	7,258	1,340	661	636	25	3,095	2,541	554	30	30	0
	Pre	6,743	6,721	22	5,594	5,572	22	587	587	0	543	543	0	19	19	0
	Post	5,641	3,744	1,897	3,004	1,686	1,318	74	49	25	2,552	1,998	554	11	11	0
Total ADAMHA	Total	2,059	1,490	569	601	349	252	1,305	1,021	284	0	0	0	153	120	33
	Pre	1,689	1,331	358	409	254	155	1,167	982	185	0	0	0	113	95	18
	Post	370	159	211	192	95	97	138	39	99	0	0	0	40	25	15
FY 1976 including the transition quarter																
GRAND TOTAL NIH and ADAMHA	Total	12,551	10,060	2,491	8,216	6,456	1,760	1,855	1,515	340	2,289	1,909	380	191	180	11
	Pre	6,673	6,477	196	4,449	4,380	69	1,496	1,372	124	607	607	0	121	118	3
	Post	5,878	3,583	2,295	3,767	2,076	1,691	359	143	216	1,682	1,302	380	70	62	8
Total NIH	Total	10,655	8,578	2,077	7,780	6,165	1,615	559	477	82	2,289	1,909	380	27	27	0
	Pre	5,282	5,270	12	4,215	4,203	12	439	439	0	607	607	0	21	21	0
	Post	5,373	3,308	2,065	3,565	1,962	1,603	120	38	82	1,682	1,302	380	6	6	0
Total ADAMHA	Total	1,896	1,482	414	436	291	145	1,296	1,038	258	0	0	0	164	153	11
	Pre	1,391	1,207	184	234	177	57	1,057	933	124	0	0	0	100	97	3
	Post	505	275	230	202	114	88	239	105	134	0	0	0	64	56	8

[a] Tabulations prepared by the institutes of the NIH and ADAMHA. Codes used are: Pre = pre-Ph.D. or pre-M.D.; Post = post-Ph.D. or post-M.D. The transition quarter is the three-month period from July 1 to September 30, 1976, during which the government changed to a new fiscal year definition. Transition quarter figures are given below.

	Total NIH and ADAMHA			Total NIH			Total ADAMHA		
	Tot	T	F	Tot	T	F	Tot	T	F
Total	1,014	320	694	908	320	588	106	0	106
Pre	142	70	72	74	70	4	68	0	68
Post	872	250	622	834	250	584	38	0	38

TABLE 1.2 Committee Recommendations for NIH/ADAMHA/HRA Predoctoral and Postdoctoral Traineeship and Fellowship Awards by Aggregate Field: FY 1979, 1980, and 1981

	Fiscal Year								
	1979			1980 (Tentative Goal)			1981 (Tentative Goal)		
Aggregate Field	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post
TOTAL	13,215	6,213	7,002	13,295	6,130	7,165	13,260	5,975	7,285
Biomedical sciences	7,450	4,250	3,200	7,450	4,250	3,200	7,450	4,250	3,200
Behavioral sciences	1,490	745	745	1,390	575	815	1,300	390	910
Clinical sciences	3,500	700	2,800	3,500	700	2,800	3,500	700	2,800
Health services research	550	325	225	715	415	300	740	430	310
Nursing research	225	193	32	240	190	50	270	205	65

TABLE 1.3 Percentage Distribution by Training Level of Recommended Traineeship and Fellowship Awards for FY 1979-81, NIH/ADAMHA/HRA

			Total			Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research[a]			Nursing Research		
			Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post
1979			Recommended awards			Recommended awards			Recommended awards			Recommended awards			Recommended awards			Recommended awards		
		N	13,215 (100%)			7,450 (56.4%)			1,490 (11.3%)			3,500 (26.5%)			550 (4.1%)			225 (1.7%)		
	Total	%	100	47	53	100	57	43	100	50	50	100	20	80	100	59	41	100	86	14
	Trainees	%	67	44	23	57	57	0[b]	82	41	41	84	20	64	75	49	26	22	19	3
	Fellows	%	33	3	30	43	0	43	18	9	9	16	0	16	25	10	15	78	67	11
1980			Recommended awards			Recommended awards			Recommended awards			Recommended awards			Recommended awards			Recommended awards		
		N	13,295 (100%)			7,450 (56.0%)			1,390 (10.5%)			3,500 (26.3%)			715 (5.4%)			240 (1.6%)		
	Total	%	100	46	54	100	57	43	100	41	59	100	20	80	100	58	42	100	79	21
	Trainees	%	67	44	23	57	57	0[b]	82	34	48	84	20	64	76	49	27	27	21	6
	Fellows	%	33	2	31	43	0	43	18	7	11	16	0	16	24	9	15	73	58	15
1981			Recommended awards			Recommended awards			Recommended awards			Recommended awards			Recommended awards			Recommended awards		
		N	13,260 (100%)			7,450 (56.2%)			1,300 (9.8%)			3,500 (26.4%)			740 (5.6%)			270 (2.0%)		
	Total	%	100	45	55	100	57	43	100	30	70	100	20	80	100	58	42	100	76	24
	Trainees	%	67	43	24	57	57	0[b]	82	25	57	84	20	64	75	49	26	35	26	9
	Fellows	%	33	2	31	43	0	43	18	5	13	16	0	16	25	9	16	65	50	15

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[a] Recommendations for health services research training reflect the restoration in FY 1979 of the training programs of the NCHSR, HRA.

[b] Although no specific awards are recommended here, the Committee recognizes the need for special exceptions to be made.

percentages of NIH/ADAMHA/HRA predoctoral and postdoctoral traineeships and fellowships by aggregate area for FY 1979-81; (3) Table 1.4 gives estimated costs for the recommended program levels for FY 1979-81, based on average cost data for stipends, etc., for FY 1976 obtained from NIH; (4) Figure 1.1 provides graphs of the Committee's recommendations for each aggregate area.

Note should be made in Table 1.1 of the significant decrease in numbers of awards made in FY 1976 compared to FY 1975. This occurred because of a decrease in the appropriations provided for the program for FY 1976. For comparisons between the numbers of awards the agencies made in FY 1976 and the target goals recommended by the Committee last year for each broad area, the reader is referred to the following tables: Basic Biomedical Sciences, Chapter 3, Table 3.16; Behavioral Sciences, Chapter 4, Table 4.14; Clinical Sciences, Chapter 5, Table 5.5; Health Services Research, Chapter 6, Table 6.3.

TABLE 1.4 Estimated Cost of Recommended Programs for FY 1979-81, Based on FY 1976 Costs, NIH/ADAMHA/HRA[a] (millions of dollars)

Fiscal Year		Total			Biomedical Sciences			Behavioral Sciences			Clinical Sciences			Health Services Research[b]			Nursing Research		
		Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post	Total	Pre	Post
1979	Total	163.8	52.7	111.1	79.2	34.4	44.8	19.8	7.1	12.7	55.4	6.2	49.2	7.0	3.1	3.9	2.4	1.9	0.5
	Trainees	103.8	49.3	54.5	34.4	34.4	0[c]	16.6	5.8	10.8	47.0	6.2	40.8	5.3	2.5	2.8	0.5	0.4	0.1
	Fellows	60.0	3.4	56.6	44.8	0	44.8	3.2	1.3	1.9	8.4	0	8.4	1.7	0.6	1.1	1.9	1.5	0.4
1980	Total	172.2	53.3	118.9	82.4	35.4	47.0	20.2	5.7	14.5	57.5	6.4	51.1	9.5	4.0	5.5	2.6	1.8	0.8
	Trainees	108.9	50.1	58.8	35.4	35.4	0[c]	16.9	4.6	12.3	48.7	6.4	42.3	7.2	3.3	3.9	0.7	0.4	0.3
	Fellows	63.3	3.2	60.1	47.0	0	47.0	3.3	1.1	2.2	8.8	0	8.8	2.3	0.7	1.6	1.9	1.4	0.5
1981	Total	180.0	52.9	127.1	85.6	36.3	49.3	20.7	3.9	16.8	60.7	6.6	54.1	10.0	4.1	5.9	3.0	2.0	1.0
	Trainees	113.8	50.1	63.7	36.3	36.3	0[c]	17.5	3.2	14.3	51.5	6.6	44.9	7.5	3.4	4.1	1.0	0.6	0.4
	Fellows	66.2	2.8	63.4	49.3	0	49.3	3.2	0.7	2.5	9.2	0	9.2	2.5	0.7	1.8	2.0	1.4	0.6

[a] Calculations were based on 1976 average cost figures (see below) derived from NIH data. No allowance has been made for increases in tuition charges or other training costs except for the 5 percent per year increase in stipends as noted below. Substantial increases in tuition charges have been noted in recent years. If, as expected, tuition should continue to increase from 1976 levels, the above estimates should be adjusted accordingly.

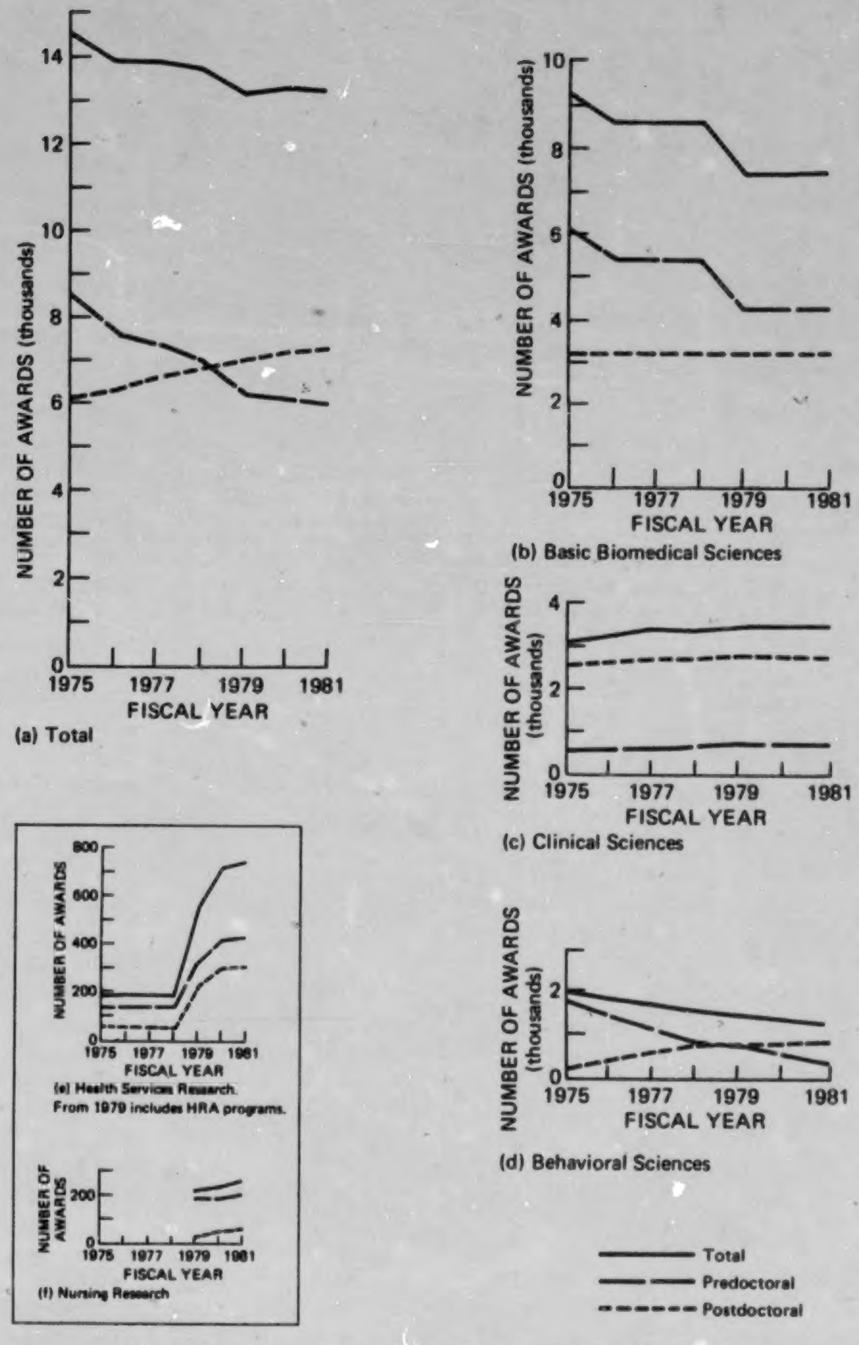
[b] Recommendations for health services research training reflect the restoration in FY 1979 of the training programs of the NCHSR, HRA.

[c] Although no specific awards are recommended here, the Committee recognizes the need for special exceptions to be made.

Estimated Total Training Costs Per Award in FY 1976 (dollars)

	Predoctoral					Postdoctoral				
FY 1976	Biomed.	Behavioral	Clinical	Health Serv.	Nursing	Biomed.	Behavioral	Clinical	Health Serv.	Nursing
Trainees	8,100	9,500	8,900	9,100	8,100	16,300	17,700	18,200	19,600	16,300
Fellows	10,000	10,000	10,000	10,000	10,000	14,000	14,000	15,000	14,000	14,000

A 5 percent increase per year on stipends was assumed in accordance with Committee's recommendation. The average stipend for predoctoral was estimated to be $4,500; the average stipend for postdoctorals was estimated at $14,000 in 1976.



(a) Total

(b) Basic Biomedical Sciences

(c) Clinical Sciences

(d) Behavioral Sciences

(e) Health Services Research. From 1979 includes HRA programs.

(f) Nursing Research

FIGURE 1.1 Summary of Committee recommendations for NIH and ADAMHA research training awards. Training grant awards are made at the end of a fiscal year and support trainees on duty in the subsequent fiscal year. Fellowship awards are made throughout the fiscal year in which the training occurs and in this report it is assumed that the fellowship awardee starts his training in the fiscal year of the award. Predoctoral training in the clinical sciences refers to the Medical Scientist Training Program leading to the combined M.D./Ph.D. degree. See Table 1.2 and NRC (1976a, p. 15).

2. ESTIMATION OF MANPOWER NEEDS

DESCRIPTION OF THE MARKETS

How the System Works

Fundamental to the task undertaken by the NAS under the NRSA Act is an understanding and analysis of the system by which biomedical and behavioral research scientists are trained and absorbed into the labor force. The mechanisms that affect career choices of students must be identified and quantified as far as possible. On the demand side, the forces that determine the number of positions available to these scientists similarly must be identified and measured. In short, a clear concept of how the education-training system works must be developed. In this chapter the Committee presents its concept of the system. In the following chapters the measurements that have been made on it to date are summarized.

The population of research scientists involved consists of the following groups of individuals:

1. Academic doctorate recipients (Ph.D., D.Sc., etc.) in the areas and fields that the Committee has defined as biomedical and behavioral sciences for purposes of this study (see the section on taxonomy in this chapter for a list of these areas and fields).

2. Academic doctorate recipients in other areas who are employed in biomedical or behavioral fields.

3. Professional doctorate recipients (M.D., D.D.S., D.V.M., etc.) whose primary interests and training are in research.

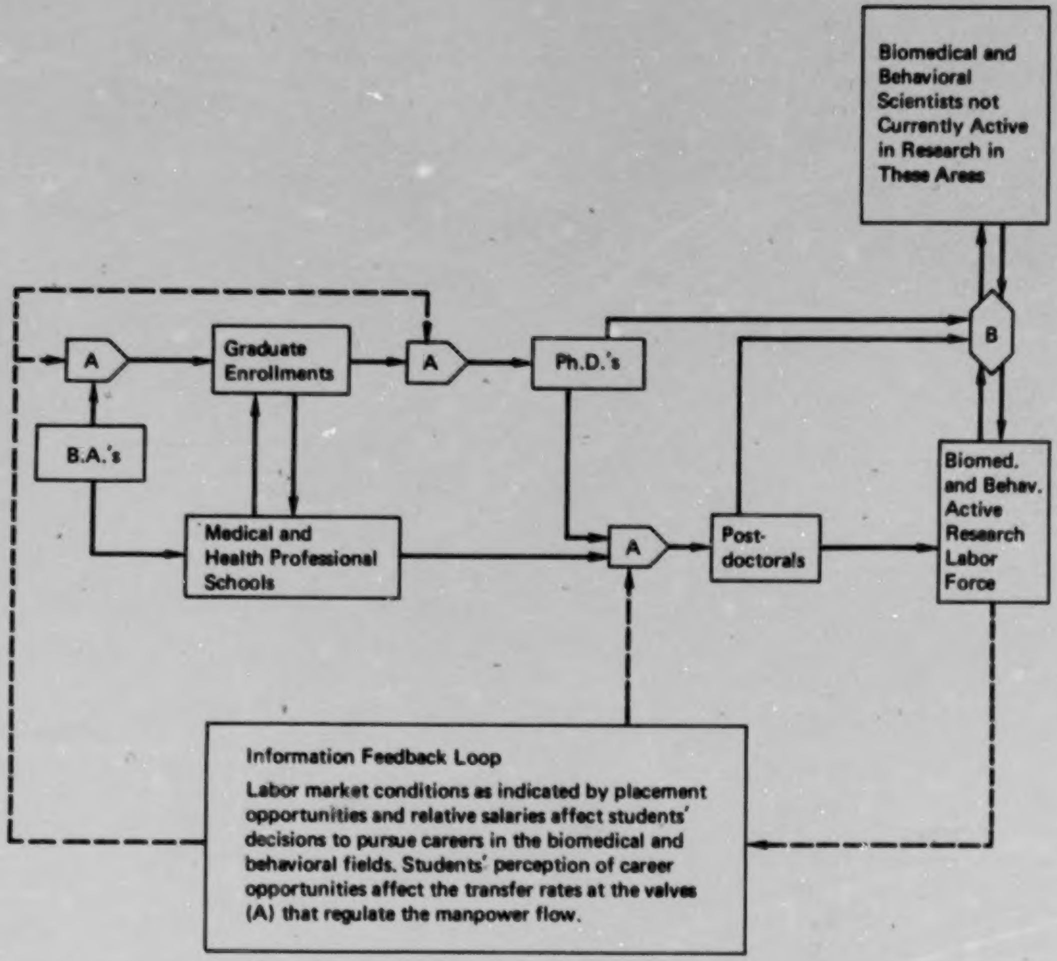
4. Other professionals, usually nurses with baccalaureate degrees, whose primary interests and training are in the area of nursing research. Further discussion of these individuals is presented in Chapter 7.

More than two-thirds of these research scientists are employed by colleges and universities (Chapter 3, Table 3.2). A good portion of the nation's biomedical and behavioral research is conducted in these academic institutions by this group of scientists with support provided by federal agencies such as the NIH. It is therefore clear that the availability of faculty positions is a critical factor affecting the employment patterns of these research scientists. Faculty positions in turn are largely determined by the pattern of student enrollments in the biomedical and behavioral fields and by the availability of research funds at colleges and universities.

In medical schools, clinical investigators perform patient care duties in addition to their teaching and research activities (Chapter 5). In recent years, even those clinical faculty members who are primarily engaged in research have devoted an increasing amount of time to patient care, particularly through the expansion of community health care programs at university medical centers. This trend is likely to continue and therefore must be taken into account in estimating the future need for clinical investigators.

The Committee views the education-training-employment system as a dynamic one, where the flow of students into biomedical or behavioral research careers involves at a minimum those components shown in Figure 2.1. Since the preparation for careers in biomedical and behavioral sciences generally begins with graduate study or even earlier in many cases, and proceeds through the attainment of the doctorate degree, the starting point in Figure 2.1 is the baccalaureate (B.A. or B.S. degree). From that point on, two separate career paths lead to the production of a biomedical or behavioral research scientist. The most frequently taken path is through graduate school to the attainment of the Ph.D. degree, a postdoctoral appointment,and then into a position as a faculty member or as an investigator at a nonacademic research organization. In some cases, particularly in the behavioral sciences, the postdoctoral period is bypassed and the individual takes a position directly upon obtaining the Ph.D. degree.

The second customary pathway is through a medical, dental, or other health professional school where the training is directed not toward research, but toward the diagnosis and treatment of diseases and other health problems. At some point during this training, some of these individuals may decide to pursue a research career. Those that do so generally undertake an additional period of training beyond the professional degree, at which time they acquire the necessary research skills. A very small but important group makes an early decision to combine research training and medical training into a single integrated training program, which leads simultaneously to the M.D. and Ph.D. degrees.


Biomedical and Behavioral Scientists not Currently Active in Research in These Areas
A
Graduate Enrollments
A
Ph.D.'s
B
B.A.'s
Medical and Health Professional Schools
A
Post-doctorals
Biomed. and Behav. Active Research Labor Force
Information Feedback Loop

Labor market conditions as indicated by placement opportunities and relative salaries affect students' decisions to pursue careers in the biomedical and behavioral fields. Students' perception of career opportunities affect the transfer rates at the valves (A) that regulate the manpower flow.

FIGURE 2.1 Flow model illustrating the principal paths and decision points leading to the biomedical and behavioral research labor force. Exits from the paths have not been graphically illustrated but are implied by the valves A and B. Solid lines signify flow of personnel. Dotted lines signify information flow. Training grant and fellowship expenditures may affect the transfer rates at points A. R and D expenditures and enrollments in undergraduate, graduate, and professional schools are important determinants of the demand for personnel in the academic sector and therefore affect the transfer rates at points B. R and D expenditures also affect demand in the nonacademic sector, as well as influencing the transfer rates at valves A.

In the biomedical and clinical sciences, a postdoctoral appointment is commonly viewed as a transition stage between the training phase and an established position as a biomedical or clinical science investigator. But it is a vital stage in which much important research is done. In fact, many view postdoctoral training to be a combination of intensive research activity and an opportunity to enhance the research techniques of the trainee under the guidance of an experienced investigator. It is generally considered to be a necessary element of training for the graduates of health professional schools, and somewhat less necessary, but nonetheless desirable, for those with Ph.D. degrees. In most behavioral science fields, however, where complex laboratory equipment and procedures are not an integral part of research, a postdoctoral period of training has been the exception rather than the rule (Chapter 4, Table 4.1).

Training grant and fellowship programs provide support to students at the predoctoral and postdoctoral levels. The stipends provided by these programs act as incentives for students to pursue careers in those areas for which such financial aid is available. There is evidence from a recent study by a committee of the NAS (NRC, 1976b) that the availability of funds for training grants and fellowships in certain areas has been associated with increased graduate enrollments in those areas relative to other areas. The empirical evidence also indicates that there is approximately a three-year delay before variations in the training program expenditures in an area are reflected in the proportion of graduate students enrolling in that area (NRC, 1976b, Chapter 5). While not conclusive, these empirical observations imply that the training programs have some influence in the long run on the supply of scientists. To the extent that they do, their impact on the system would occur at points A in Figure 2.1 and would tend to modify the flow of students at these points.

An additional regulating factor in the system evolves from students' perceptions of job opportunities and relative salaries. As labor market conditions change, students tend to alter their career plans accordingly. It is not clear at this point, however, that students' assessments of the market are accurate enough, or their reactions prompt enough, to prevent the development of short-run imbalances between supply and demand.[1] There are complex lead and lag times in this dynamic system that are not yet thoroughly understood. Under these conditions, the Committee believes that the most appropriate strategy is continually to appraise the current market situation and the near-term outlook with a view to anticipating impending imbalances and recommending steps to avoid them. Adjustments in federally supported training programs should be made where and when appropriate to help achieve system balance.

The Concept of Balance Between Supply and Utilization

A comment on the concept of "balance" is appropriate. When dealing with Ph.D.'s and M.D.'s, many of whom have postdoctoral training, one would not expect that many would be unemployed for significant lengths of time. Such highly trained persons will almost always find work, and any study that views a cross section of biomedical and behavioral scientists will generally find them employed. Any survey that asks universities about their "capacity to absorb" or "their need for" more such personnel will almost always find that capacity or need to be great, based on the potential contribution of these highly trained professionals. Since the expert judgment of faculty members usually produces somewhat inflated estimates of the need for additional faculty, it is not considered to be a reliable indicator of actual demand as measured by more objective criteria.

For an examination of "balance," which is relevant to policy, the concepts of need, demand, and utilization must be related to the cost to society of producing such skilled professionals, to the prospects of their being employed in activities that require the full range of skills imparted in their costly training, and to the question of whether the costs of this training should be provided from public funds. Thus, it is essential to specify, or at least examine, the future possibilities for employment of these professionals at tasks commensurate with their training and to distinguish realistic estimates of available future opportunities from unrealistic notions of potential utilization.

It is here that confusion arises. Scientists observe an enormous potential for basic and applied research. On this basis, some argue that, since there are insufficient numbers of scientists to carry out these large research agenda, additional scientists must be trained. This view was expressed by several participants at the public hearing held by the Committee in November 1976. On the other hand, others argue that potential alone is an insufficient basis for diverting resources to training such personnel. Although there are unlimited areas where professional and technical manpower could perform productive research, it is necessary to base public funding of training of this type of scientific manpower on the actual amount and distribution of support for research that the society can be expected to provide through its social, economic, and political mechanisms. In this view, it is erroneous to contend that, if research support for particular areas such as the biomedical and behavioral sciences, is not adequate fully to employ all qualified persons, nothing is lost because Ph.D.'s and M.D.'s trained in research nevertheless will be employed in other productive positions. Under these circumstances the extra costs incurred in their specialized research training may not be necessary for the adequate performance of their duties.

The public policy question that is directly raised is the extent to which the "extra" costs of training more people than necessary should be borne by public funds. Some inexactness in forecasting needs is inevitable. Some cushion of excess research manpower is desirable. The maintenance of strong research training institutions is also important for the future of science. All of these factors must be taken into consideration in formulating public policy.

A change in national policy with respect to public funding of research in a general area such as basic biomedical sciences, or in a particular field, such as molecular biology, could create grave difficulties if field-switching by professional manpower were limited. To the extent that professional manpower is sufficently broadly trained that researchers can quickly change fields, perhaps after short-term training such difficulties are less likely to arise. Similarly, if society has in the past produced a "surplus" of research scientists who are employed at jobs that require less than their full skills, these professionals can shift to new fields of interest where their training can be more fully utilized.

The variability of society's demand for research, and the value of having a reserve of trained research personnel to meet emergent research needs, have been suggested as a rationale for an ample or oversupply of such manpower. Yet this rationale has significant faults. First, there are limits to the amount of extra training costs for unused skills that can be justified for the use of public funds. Second, obsolescence of high-level research skills proceeds at a rapid rate, and it is questionable whether these reserves could perform effectively several years later should society need them at that time. Finally, the quality of incoming students might well be affected, if they could not anticipate with confidence that they would, in fact, be using the skills they must work so hard to develop.

The most promising new developments in manpower analysis have grown out of attempts to remedy the shortcomings of prior projections based on simple extrapolation of trends, international comparisons, and surveys. These newer approaches, some of which are implemented in later chapters, seek to identify the factors, particularly those on the supply side, that determine students' choices, and to explain the system within which these factors operate. These approaches have profound implications for the task of the Committee.

First, economic factors, some resulting from the interplay of market forces and others from public policy decisions that affect the cost of students' education, play an important role in students' decision to embark upon graduate study and to choose a particular field of specialization. Relative earnings, cost and duration of study, availability of stipends and other support, and prospects of employment in particular fields of study are examples of such factors. The contention that the specific field of study or the decision to obtain a Ph.D. is generally dependent upon economic considerations does not ignore the noneconomic motivations in the demand for higher education. Rather, the argument is that marginal choices are influenced by the relative economic attractiveness of various alternative areas of study. Thus, projections of the supply of biomedical and behavioral scientists, and particularly the distribution of this supply by fields, must be grounded in accurate estimates of the future economic status of these fields relative to other fields requiring similar amounts of training.

Second, estimation of the economic prospects for the biomedical and behavioral sciences depends in turn on the supply response of future potential graduate students. That is, the relative salaries and prospects for employment of these scientists depend on their number in the labor force, as well as on research budgets and the numbers of graduate students to be trained. Thus, as Freeman (1971) and others have shown, the dynamics of the supply and demand for any broad area of professional manpower involves significant interactions among these factors, for which the magnitude and speed of adjustment cannot easily be estimated. For example, a decrease in the rate of real biomedical R and D expenditures can be expected eventually to reduce the relative salaries of research personnel in this area with the reductions affecting most quickly new postdoctoral entrants into the job market. This reduction in turn will tend to discourage first-year graduate enrollments in this area and perhaps undergraduate majors in biology, but may also lead to some increased utilization of the now less costly personnel in the area who have already been trained as researchers. The reduction in Ph.D.'s will tend to lessen the decrease or perhaps even increase relative salaries and will subsequently affect future enrollments.

The key questions that these concerns raise for making projections of future needs relate to the length of time these various adjustments will take, how complete they will be, and how strong their influence will be. We do not have precise answers to these questions. They probably differ from field to field and surely are influenced by the degree to which personnel in any field has reasonably close substitutes in related fields.

Given these uncertainties it is not surprising that no attempts have been made to further disaggregate projected utilization of professional manpower by area or fields. Yet the NRSA Act clearly calls for such disaggregation. To approach this task for the areas of concern to the Committee, it is necessary to make some assumptions regarding the composition of future R and D expenditures, to develop some estimates of professional manpower requirements, and to assess the degree of potential substitution among those trained in different fields for various types of biomedical and behavioral science research.

Many individuals and groups, including this Committee, are now investigating different aspects of the problems outlined above. Organizations and agencies concerned with manpower analysis, particularly the National Science Foundation, also are attempting to find better ways of handling these concerns.

Nevertheless, it is essential to realize that projections of manpower supply and utilization inevitably must be based on judgments and assumptions. In subsequent chapters these judgments and assumptions are specified and applied to logical models of particular components of the labor market to derive estimates of future manpower supplies and utilization.

Considerable uncertainty also remains about what can be said about the statutory mandate that the Committee specify fields that should be given priority in research training programs. This issue is intertwined with the problem of taxonomy--the labeling and classification of the fields within the areas of the biomedical and behavioral sciences. Both aspects of this issue are addressed in the following section.

ESTIMATION OF NEEDS AT THE DISCIPLINARY LEVEL--THE TWIN PROBLEMS OF TAXONOMY AND MOBILITY AMONG FIELDS

Each of the broad areas into which the biomedical and behavioral fields have been divided in this study encompasses a number of similar fields. Biochemistry is perhaps the dominant discipline within the basic biomedical sciences, as measured by the number of scientists who identify themselves as biochemists. But there are at least 20, and perhaps as many as 40, other fields that could be classified as basic biomedical sciences, depending on the taxonomy that is used.

This circumstance raises the first major problem encountered by the Committee in attempting to estimate manpower needs at the field level. Many different taxonomies have been used in the past and are currently used by the federal and nonfederal organizations concerned with its administration to describe the fields of biomedical and behavioral science.

Even within a single agency, such as the NIH, several different taxonomies are used, and the differences among them can be quite significant. Trainees and fellows of the NIH are classified according to a detailed nomenclature called the Discipline, Specialty, Field (DSF) Code. This is a system of more than 600 titles and subtitles covering in great detail the biological, clinical, and behavioral sciences and, in lesser detail, the physical sciences, the engineering, agriculture, environmental, and other health-related fields, and most of the nonscience fields (Table 2.1).

Personnel employed on, or contributing to, research grants sponsored by the Institutes of the NIH are classified into a set of 133 disciplines called the Field, Discipline, Specialty (FDS) code. It is related to the DSF code in that it provides considerable detail within the basic biological and clinical sciences, although it is more compact in other areas.

A third taxonomy in use within the NIH is called the Central Scientific Classification System (CSCS), a multiaxis scheme designed to describe the NIH research grants and contracts programs according to the fields, body systems, and research materials involved in the project.

There is at least one more taxonomy in general use at the NIH. Each institute uses a set of program areas to describe the focus of its research and training programs. In some cases these have the customary field titles such as pathology, bioengineering, or physiology, and in other cases they describe much broader areas of interest, such as carcinogenesis, blood resources, or the medical scientist program.

ADAMHA has recently developed a two-dimensional scheme for classifying its trainees and fellows (Table 2.2). One axis describes the fields of training, while the other describes the problem area. Because individuals trained in a particular field often contribute to research in several problem areas, this scheme offers a reasonable and realistic method of classification. The Committee has found that in many cases, notably in the fields of epidemiology and biostatistics and the area of health services research,[2] the area or field alone does not provide an adequate description of an individual's expertise. But the use of a two-dimensional matrix such as in Table 2.2, expanded to include a more comprehensive set of fields and problem areas would largely overcome this problem by providing the additional dimension required for adequate classification of an individual.

Organizations other than the NIH are also heavily involved in collecting and disseminating data relating to manpower and expenditures for scientific activities and have their own taxonomies. Again, there is no formal mechanism for coordinating these activities, and as a result no standard taxonomy exists. This of course leads to considerable difficulty in merging and comparing data published by different organizations. The NSF usually publishes its manpower and funding data only for broad areas or fields such as biological sciences, clinical sciences, psychology, chemistry, physics, etc. The Office of Education tabulates data about enrollments and degrees by field, while the NRC also collects information by field about the doctorate population in its annual Survey of

TABLE 2.1 The NIH Taxonomy for Trainees and Fellows: Discipline, Specialty, Field Code[a]

- Gen. med. and bio. sciences
  - Anatomy
  - Biochemistry
  - Biophysics
  - Microbiology
  - Pathology
  - Pharmacology
  - Physiology
  - Multidisciplinary
  - Radiation, nonclinical
  - Entomology
  - Genetics
  - Nutrition
  - Hydrobiology
  - Ecology
  - Cell biology
  - Zoology
  - Botany
  - Biology, not elsewhere classified
  - Other gen. med. and bio. sciences

- Clinical medicine
  - Internal medicine
  - Allergy
  - Pediatrics
  - Geriatrics
  - Obstetrics-gynecology
  - Radiology
  - Surgery
  - Otorhinolaryngology
  - Ophthalmology
  - Anesthesiology
  - Neurology
  - Psychiatry
  - Preventive medicine
  - Other clinical medicine

- Clinical dentistry

- Other health-related activities
  - Health administration
  - Nursing
  - Social work
  - Engineering, health-related
  - Veterinary medicine
  - Biostatistics
  - Epidemiology
  - Other health-related professions and activities

- Community health fields
  - Accident prevention
  - Maternal and child health
  - Dental public health
  - Mental health
  - Other community health fields

- Environmental health fields
  - Radiological health
  - Water pollution control
  - Air pollution
  - Environmental engineering
  - Food protection
  - Occupational health
  - Environmental sciences
  - Other environmental health fields

- Psychology
  - General and experimental psychology
  - Comparative and animal psychology
  - Physiological psychology
  - Developmental psychology
  - Personality psychology
  - Social psych.-sociological aspects
  - Abnormal psychology
  - Clinical psychology
  - Education, counseling, and guidance
  - Other psychological areas

- Behavioral sciences except psych.
  - Sociology
  - Social psych.-sociological aspects
  - Anthropology
  - Social sciences & related discip.

- Math., phys. sciences, engr., other
  - Mathematics
  - Chemistry
  - Physics
  - Earth and related sciences
  - Agricultural fields
  - Engineering
  - Other fields

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[a] Only the major group headings are shown here. In the complete code, each specialty may have up to 10 or more subspecialties.

TABLE 2.2 The Two-Dimensional Taxonomy Used by ADAMHA to Classify Trainees and Fellows

	Research Areas								
	Development of Behavior			Disorders and Maladaptive Behavior Related to Alcohol, Drug Abuse, and Mental Health					
Disciplines	Biological Determinants	Psychological Determinants	Sociocultural Determinants	Etiology	Psychopathology	Prevention	Treatment Evaluation	Social Issues Related to Alcoholism, Drug Abuse, and Mental Health	Services Research
Biological sciences									
Behavior genetics									
Biological anthropology									
Neuro-behavioral sciences									
Psych.-neuro.-pharmacology									
Ethology									
Other and unspecified									
Psychological sciences									
Child and developmental									
Social and ecological									
Cognition									
Perception and sensory									
Physiological									
Clinical and developmental									
Other and unspecified									
Social sciences									
Cultural anthropology									
Sociology									
Epidemiology									
Other and unspecified									
Other									

Earned Doctorates and its biennial Survey of Doctorate Recipients.

As a result of this plethora of taxonomies, the Committee and panels have faced an especially vexing problem. In carrying out the mandate of the NRSA Act to determine the needs for biomedical and behavioral research personnel and to specify the kinds and extent of training to be provided, it has been confronted with the fundamental and frustrating task of developing a satisfactory taxonomy and relating it to those currently in use.

The issue of taxonomy is fundamental, because the definition, labeling, and classification of scientific research fields must occur before rational measurement and analysis can proceed. The task would be considerably simplified if all previous taxonomies could be ignored and a fresh start made. Unfortunately, this would vitiate the considerable body of data that has accumulated over the almost 40 years that federally supported training programs have existed. These data provide much of the material on which the Committee must base its recommendations, and their conversion to a common taxonomic base would be an expensive and time-consuming task.

Despite the progress the panels have been making in developing a satisfactory taxonomy in certain cases, a generally acceptable solution is not yet in sight, and considerable further effort will be needed.

The Committee nonetheless has had to proceed with its own taxonomy in undertaking several surveys needed to obtain data to carry out its mandate. It conducted two surveys during 1976 and 1977 to develop data on the current labor market from the viewpoint of the individual and of the academic department chairmen. The first survey was directed to recent Ph.D.'s in the biomedical and behavioral fields and was concerned with their employment and utilization. For that purpose, a taxonomy was developed consisting of the field titles that describe basic biomedical and behavioral sciences in this study. Hereafter in this report, the biomedical and behavioral sciences are defined and reported by the specific fields listed in this taxonomy or approximations thereto. The taxonomy employed in the survey, and the corresponding set of fields from the Doctorate Records File, are shown in Table 2.3. In Chapters 3 and 4, estimates of the number of Ph.D. degrees awarded annually will differ because of minor differences between these two taxonomies.

The second survey was directed to the chairmen of biomedical and behavioral departments in Ph.D.-granting institutions. Since it was designed partly to supplement data collected by the NSF in its annual departmental survey, the NSF list of department titles was used to identify the group to be included in the Committee's survey. These department titles are also shown in Table 2.3.

TABLE 2.3 Taxonomy of the Basic Biomedical and Behavioral Sciences Used in the Committee's Surveys

Survey of Recent Ph.D. Recipients		Departments Included in the Chairman's Survey
Survey Taxonomy	Corresponding Fields from the Doctorate Records File	
Biomedical fields	Biomedical fields	Biomedical sciences
Animal sciences	Anatomy and embryology	Biomedical engineering
Biochemistry and molecular biology	Animal physiology	Anatomy
Biomathematics and biostatistics	Biochemistry molecular biology	Biochemistry
Biomedical engineering	Biomathematics and biostatistics	Biophysics
Biophysics	Biomedical engineering	Microbiology
Cell biology	Biophysics	Pathology
Developmental biology	Environmental sciences	Pharmacology
Environmental health and toxicology	General biology	Physiology
Epidemiology	Genetics	Biology
Evolutionary and taxonomic biology	Immunology	Biometry/biostatistics
General biology	Microbiology	Cell biology
Genetics	Pathology	Genetics
Immunology	Pharmacology and pharmaceutical sciences	Nutrition
Microbiology	Public health	Zoology
Morphological sciences	Veterinary medicine	Neurosciences
Neurobiology	Zoology	Pharmaceutical sciences
Nutrition and food sciences	Biosciences, other	Veterinary sciences
Pathology	Medical sciences, other	Public Health/prev. med.
Pharmacology and pharmaceutical sciences		Epidemiology
Physiology		Health services
Public health		Basic bioscience, nec
Virology		
Biomedical sciences, other		
Behavioral fields	Behavioral fields	Behavioral sciences
Anthropology, subtotal	Anthropology	Psychology
Biological and medical	Clinical psychology	Communication sciences
Social and cultural	Psychology, subtotal	Anthropology
Other	Counseling and guidance	Sociology
Psychology, subtotal	Developmental and gerontological	Sociology/anthropology
Clinical	Educational and school	Behavioral sciences, nec
Cognitive	Experimental	
Counseling and guidance	General psychology	
Human development and gerontology	Physiological and comparative	
Human learning and performance	Psychometrics	
Neurobehavioral sciences and psychopharm.	Social	
Perceptual and sensory	Other	
Personality and experimental	Sociology	
Physiological and comparative	Speech and hearing sciences	
Psycholinguistics		
Psychophysics and psychometrics		
Social		
Other		
Sociology, subtotal		
Complex organizations and professions		
Criminology and deviant behavior		
Demography		
Medical		
Other		
Other behavioral, subtotal		
Communications sciences		
Ethology and sociobiology		
Other		

In its previous reports, the Committee has made recommendations only for the broad areas, awaiting the outcome of efforts by panels and staff to assess the situation at the field level. One fact is becoming clear as a result of this exploration. Considerable mobility occurs within most of the broad areas. Individuals who receive their Ph.D. in one field are frequently found to be employed in a different but related field within the area (these data will be presented in Chapter 3). From the point of view of the individual involved, this might be called field-switching; from the employer's point of view it represents substitutability among the fields.

Although there is little support for the proposition that research personnel trained in different fields are completely interchangeable, field-switching data do indicate that, within some limits as yet undefined, substitution can and does occur. The Committee's studies are progressing, but are not yet to the point where fields can be grouped into those that represent homogeneous clusters within which there is considerable mobility and between which mobility is more difficult.

A second major problem then arises. If there is general substitutability among the fields of a particular area (e.g., the basic biomedical sciences), is there any need to emphasize training in a particular field within that area? Would a policy of providing a broad spectrum of training be the proper one under these circumstances?

The Committee has thus far concluded that predoctoral training should cover a broad range of fields so that the student may be broadly exposed to various aspects of the scientific area. The identification of priority fields for training at the predoctoral level in general would be an undesirable policy. If fields are to be singled out for priority in the allocation of training funds, this should be done primarily at the postdoctoral level.

The third major problem, therefore, is to develop criteria for assigning priorities to postdoctoral training fields. At the broad area level (i.e., basic biomedical sciences, clinical sciences, etc.), the Committee has based its previous recommendations on an assessment of need as determined by the likely near-term balance between supply and demand at prevailing salary levels. Trends in enrollments, Ph.D. production, and R and D expenditures have been prominent factors in the analysis. It is doubtful that a similar approach would be feasible at the field level, given the difficulty of obtaining detailed data on the various factors involved. However, it is quite possible that further study of this problem will yield an alternative feasible procedure.

One approach that the Committee has been investigating would attempt to determine training priorities by examining the field mix represented by the professional personnel that have been utilized on research grants of the sponsoring agencies. The basic premise of this approach is that each of the problem areas of interest to the NIH, ADAMHA, and HRA utilize research personnel from a different mix of fields, and if the field mixes were known in each case they might serve as guides to training priorities. In essence, this approach provides a direct link between training and research programs.

How is this linkage to be constructed? Since 1973, the NIH has been collecting data on the characteristics of personnel employed on their research grants and those contributing to, and not paid from, grant funds. These data are now being analyzed by the Committee. Although preliminary results are available (see Volume 2), it is clear that some basic problems must be solved before these linkages can be relied on. Among them is the task of deciding how the problem areas should be specified--whether the level of resolution should be the study sections that review the grant applications, the program areas of the institutes, or just the institutes themselves. Whichever is chosen, it must lend itself readily to the estimation of future funding levels, for the problem of specifying current training priorities is closely related to the problem of anticipating future research needs. These in turn will be largely determined by the level and distribution of grant and contract funds.

Another survey of the labor market for biomedical scientists, conducted by Westat, Inc., for the NIH in 1975, was designed to develop information on both the demand and supply sides of the market. Employers were asked to list the number of budgeted vacancies occurring between May and September 1975. At the same time, suppliers (primarily the training program directors at colleges and universities) of biomedical scientists were asked to list the number of persons expected to complete their training during the same period. National estimates of supply and demand were then developed from the responses. The NIH has reported that the survey results indicate shortages of biomedical scientists existed in certain fields in 1975, particularly in the clinical area.

The Committee has followed the progress of the Westat survey with interest and has requested details of the sampling and estimating procedures. Substantial questions have been raised about the survey methodology and, in particular, about the criterion for estimating the demand for biomedical scientists. Unfortunately, the details of this survey were made available just as the report was in preparation and the Committee was therefore unable to analyze them in time for inclusion in this report. Further study will be given to the Westat survey over the coming year, and a full discussion will be included in the 1978 report.

Only in the basic biomedical sciences area has the Committee felt that sufficient information is available to enable some specific statements to be made this year about priority fields (Chapter 3). As stated in Chapter 1, survey results and expert judgment have been the main sources on which the Committee has relied in recommending special attention be given to certain fields.

OVERVIEW OF LABOR MARKET ANALYSES

In the following two chapters data are presented on the population, manpower flows, and anticipated balance between supply and demand in the broad areas of research covered in this study. Knowledge of the market system is far from complete in terms of the information desired, especially in the areas of clinical sciences, health services research, and nursing research. Nonetheless, the Committee was able to complete an extensive analysis of employment prospects in the basic biomedical and behavioral sciences. In particular the Committee examined (1) the extent to which changing market conditions have affected the employment patterns of recent Ph.D. recipients in these fields; (2) the factors that have contributed to recent expansion in the biomedical and behavioral labor forces; and (3) the employment outlook in these fields, given various assumptions about factors affecting the demand for Ph.D. personnel in the academic sector.

In examining the current employment experience of recent biomedical and behavioral science graduates, the Committee noted that other surveys (e.g., NRC, 1973 and 1975d) had not revealed high levels of unemployment, even in fields that might seem to have a significant oversupply of trained research personnel. The Committee decided to investigate changes in the types of positions taken after graduation and to search for shifts from presumably overpopulated training fields into other fields with greater employment opportunities. In many biomedical science fields, employment difficulties might manifest themselves by prolongation of postdoctoral study. In other biomedical and behavioral fields, market imbalances might be reflected by increases in the number of graduates taking positions that did not utilize their predoctoral training. Wherever possible, these market adjustments were considered separately for each field within the biomedical and behavioral sciences.

The Committee also attempted to identify factors that have contributed to the expansion of the biomedical and behavioral science labor forces in recent years. An understanding of the relative importance of such factors as annual Ph.D. production, field-switching, and attrition (retirement and death) has provided valuable insight into the likelihood of continued growth in these labor forces.

Some attention has also been given to differences in the rates of expansion in the academic and nonacademic sectors.

Finally, the Committee has developed models of academic market demand for Ph.D. personnel in the biomedical, behavioral, and clinical sciences. Projections of future needs for research personnel were made on the basis of alternative assumptions about anticipated changes in both R and D expenditures and total graduate and undergraduate enrollments in these areas. The assumptions used in each model cover what are considered to be the likely range of possibilities for research funding levels and enrollments in the next five years. Projections of demand for faculty were derived from alternative applications of the models and compared with expected growth in the research labor forces.

Although data in the areas of clinical science and health services research and nursing research were not as readily available, some preliminary analyses of labor market conditions were undertaken in those areas as well. In the clinical science area, a model based on R and D funding and enrollments in medical schools has been developed to project future demand for clinical science faculty (Chapter 5). While this model is not as precise as the Committee would like, it provides some insight into future demand for clinical investigators. No accurate count of the number of currently active clinical investigators could be made at this time. Nonetheless, information from NIH training programs and other sources has been used to estimate trends in the numbers of M.D.'s entering research careers in recent years.

In the areas of health services research and nursing research, some information on the utilization patterns of recent graduates has been collected (similar to that available for biomedical and behavioral science graduates). This information has provided the Committee with some indications of current supply in these two areas. However, it has not been possible to determine the size of the populations available to do research. Personnel qualified to work on problems in health services research were particularly difficult to identify since they received doctoral training in a variety of biomedical, behavioral, and related fields and since many of them have moved into and out of the health services research at different stages in their careers. Even less is known about the future needs for personnel trained in areas of health services research and nursing research. Nevertheless, the Committee was able to make some comments on the outlook for these areas on the basis of its knowledge of the current market experience for recent graduates and its general impressions of opportunities for research in these areas. These will be found in Chapter 6 for health services research and in Chapter 7 for nursing research.

FOOTNOTES

1. The direction of the adjustments are difficult to foresee. For example, shortages in employment opportunities in a field may influence some persons earning baccalaureates in that field to enter graduate school rather than take a job that does not meet their expections.

2. A list of problem categories that the Panel on Health Services Research has developed to define that area is presented in Chapter 6.

3. BASIC BIOMEDICAL SCIENCES

The federal government sharply increased its support of health-related research more than two decades ago. Since then, scientific research in all fields of the basic biomedical sciences has flourished to a degree that few could have foreseen. The rapid growth of biomedical research led to the expansion of federal programs for the support of graduate education and research training in these fields. Under these programs, many young scientists have been trained for careers in biomedical research. However, evidence from several sources suggests that career employment opportunities for biomedical scientists may not be increasing as rapidly in the future.

In its 1976 report (Chapter 3) the Committee concluded from the information available that basic biomedical science Ph.D.'s in the next few years were likely to encounter increasing difficulty in finding employment in the academic sector that fully utilizes their research training. In reaching this conclusion, several pertinent reports were considered, including two forecasts of the markets for Ph.D. scientists done by the Bureau of Labor Statistics (1975) and the NSF (1975c). Also examined were data from NRC surveys on recent trends in factors affecting the labor markets. The Committee found information from all of these sources helpful, but, because of major differences in the numerical projections, it was felt that more detailed investigations were required. As mentioned in Chapter 1, many new data have been compiled this year, and more comprehensive analyses of both the current and prospective labor markets for biomedical scientists have been completed. Summaries of these analyses are presented in this chapter.

CURRENT EMPLOYMENT OF RECENT PH.D.'S

In assessing future needs for research personnel in the basic biomedical sciences, the Committee began by examining data on the current employment of recent Ph.D. recipients in this area. It seemed reasonable to expect that changing conditions in the labor market might first be noticed in shifts in the employment situations of those who had just entered that market. Findings from the Committee's survey of 1971-75 Ph.D. recipients in basic biomedical fields provided information about six specific aspects of their current employment situations: (1) percentage with full employment, (2) types of positions held, (3) changes in the number of postdoctoral appointments and other temporary positions, (4) mobility among training and employment fields, (5) utilization of research training in their current jobs, and (6) employment opportunities for personnel trained in different fields.

Responses were obtained from 5,575 (72 percent) of the 7,784 biomedical graduates surveyed.[1] From these responses, estimates were derived for the total population of approximately 14,300 persons who received doctorates in basic biomedical fields between 1971 and 1975. A preliminary investigation of the characteristics of persons who did not respond to the survey revealed no important biases.[2]

Findings from the survey indicated that all but a few biomedical Ph.D. recipients were employed in full-time positions or held postdoctoral study appointments. Results in Table 3.1 summarizing the current employment status of these recipients and their employment history since graduation specifically showed:

- At the time of the survey (October 1976), 94 percent of the 1971-75 graduates held regular full-time positions or postdoctoral appointments; less than 2 percent of the graduates were unemployed and seeking jobs.

- An average of almost 92 percent of the 1971-75 graduates' total time (in months) since earning the Ph.D. had been spent either in regular full-time employment or on a postdoctoral appointment; less than 2 percent of these graduates' time had been spent unemployed and seeking a job.

No evidence was found to indicate that 1975 Ph.D. recipients were having more difficulty in finding positions than 1971-74 graduates. In fact, only 1 percent of the 1975 graduates were unemployed and seeking jobs at the time of the survey.

The types of positions held by recent Ph.D. recipients were quite similar to those held by older members of the biomedical labor force. In its 1976 report (Chapter 3), the Committee estimated that approximately two-thirds of the Ph.D. labor force (including postdoctorals) in this area were employed in the academic sector and that most of these scientists spent at least some time in research. The

TABLE 3.1 Employment Status of 1971-75 Biomedical Ph.D. Recipients[a]

			Fiscal Year of Doctorate				
		Total	1971	1972	1973	1974	1975
Employment status (as of October 1976)							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Postdoctoral appointment	%	20.0	5.5	7.7	15.9	26.5	43.7
Full-time employment	%	74.0	88.6	85.4	78.4	67.9	50.5
Part-time employment	%	1.6	1.7	2.1	2.4	0.8	1.1
Seeking employment	%	1.7	1.7	2.1	1.8	1.6	1.1
Other status	%	2.7	2.5	2.6	1.5	3.2	3.5
Survey item responses	N	4429	725	769	801	841	1293
Estimated total Ph.D.'s	N	14288	2792	2842	2799	2982	2873
Average time since receipt of doctorate spent in:							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Postdoctoral appointment	%	37.4	25.9	29.2	35.3	42.4	53.3
Full-time employment	%	54.3	67.6	62.8	55.1	49.0	38.0
Part-time employment	%	2.4	1.7	2.6	3.0	2.5	2.0
Seeking employment	%	1.5	1.1	1.1	1.6	1.5	2.2
Other status	%	4.5	3.8	4.4	5.0	4.6	4.6
Survey item responses	N	4378	718	756	790	831	1283
Estimated total Ph.D.'s	N	14288	2792	2842	2799	2982	2873

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[a] See Appendixes B1 and B2 for comparable data in each of the basic biomedical fields specified in the survey taxonomy.

[b] Includes students and others who were unemployed and not seeking employment.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

Committee's survey of 1971-75 Ph.D. recipients confirmed this estimate (Tables 3.2 and 3.3):

- Approximately 68 percent of these graduates were employed by universities, four-year colleges, medical schools, or other professional schools.
- An average of more than 55 percent of the graduates' time was spent in research activities, and another 23 percent in teaching.
- Almost 90 percent of the graduates devoted at least some time to research.
- Of those doing some research, nearly all considered their work to be directly (59 percent) or indirectly (36 percent) related to health, and 63 percent received support for their research from NIH or other federal sources.

A comparison of the employment situations of 1975 graduates and earlier doctorate recipients revealed a significant increase in the percentage taking postdoctoral appointments (Table 3.4). The majority of those who have taken such appointments stated that they did so in order to obtain additional research experience. This recent increase in postdoctoral study has provided both better qualified research personnel and greater opportunities for recent graduates to contribute to the total biomedical research effort. In fact, although postdoctoral appointees constituted only one-fourth of the 1971-75 Ph.D. recipients employed in academic institutions, they accounted for more than 42 percent of the total time devoted to research by this group (Table 3.5).

However, the Committee was troubled by indications that many now holding postdoctoral appointments or other temporary positions may have difficulty in finding tenured positions in the future. As summarized in Tables 3.5 and 3.6, survey results showed:

- In addition to the 25 percent on postdoctoral appointees, another 19 percent of the 1971-75 graduates employed in the academic sector held positions not considered to be in a tenure track (mostly doctoral research staff).

TABLE 3.2 Employment Sector and Work Activities of 1971-75 Biomedical Ph.D. Recipients[a]

		Total	Trainees/ Fellows[b]	Fiscal Year of Doctorate				
				1971	1972	1973	1974	1975
Type of employer or postdoctoral affiliation								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Educational institution	%	70.2	(73.9)	69.9	67.6	70.3	69.9	72.9
University/college	%	29.8	(27.6)	30.0	30.4	31.8	28.0	28.9
Medical school	%	30.9	(36.7)	30.5	27.5	29.6	32.7	34.1
Other health professional school	%	7.2	(8.0)	7.8	7.1	6.9	6.7	7.5
Other educational institution	%	2.2	(1.7)	1.6	2.6	1.9	2.4	2.4
Government	%	11.4	(9.7)	10.1	13.2	11.0	11.2	11.5
Federal government	%	9.7	(8.3)	8.0	11.4	8.8	10.1	10.1
State or local government	%	1.7	(1.5)	2.1	1.8	2.2	1.2	1.4
Business/industry	%	11.7	(10.5)	15.0	11.7	11.9	11.8	8.4
Pharmaceutical firm	%	4.3	(4.0)	6.7	4.3	3.7	3.8	3.0
Other business or industry	%	7.5	(6.5)	8.3	7.4	8.1	8.0	5.4
Other organizations	%	6.7	(5.9)	5.0	7.5	6.8	7.0	7.2
Hospital or clinic	%	2.8	(2.3)	1.5	2.3	4.0	3.0	3.1
Other types (including non-profit)	%	3.9	(3.6)	3.5	5.2	2.9	4.1	4.1
Survey item responses	N	4200	(2087)	690	723	770	791	1226
Estimated total employed	N	13671	(6139)	2676	2709	2706	2840	2740
Average time spent in:								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Research and development	%	55.5	(59.8)	50.6	50.3	52.0	57.7	66.4
Teaching	%	23.5	(21.6)	27.0	26.1	26.2	21.7	16.9
Management and administration	%	11.1	(9.1)	13.7	13.2	10.9	10.8	7.2
Consulting	%	2.8	(2.5)	2.6	2.7	3.4	2.5	2.7
Other professional services	%	5.4	(5.2)	4.5	5.5	5.7	5.9	5.4
Other activities	%	1.7	(1.8)	1.6	2.3	1.8	1.4	1.4
Percent of employed Ph.D.'s involved in some research	%	89.5	(91.0)	91.1	89.8	88.9	87.8	89.9
Survey item responses	N	4160	(2066)	681	710	761	786	1222
Estimated total employed	N	13671	(6139)	2676	2709	2706	2840	2740

[a] See Appendixes B3 and B4 for comparable data in each of the basic biomedical fields specified in the survey taxonomy.

[b] Includes all biomedical Ph.D. recipients who received predoctoral training grant or fellowship support from NIH, ADAMHA, or HRA.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

TABLE 3.3 Health-relatedness and Source of Support for Research Conducted by 1971-75 Biomedical Ph.D.'s[a]

		Total	Trainees/ Fellows[b]	Fiscal Year of Doctorate				
				1971	1972	1973	1974	1975
Research related to health								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Directly	%	58.6	(59.7)	63.7	60.4	58.8	57.4	53.0
Indirectly	%	35.5	(37.1)	29.3	36.3	35.2	36.1	40.3
Not at all	%	5.9	(3.1)	7.0	3.3	6.0	6.5	6.7
Research support from:								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Nonfederal sources	%	37.0	(33.0)	39.3	36.9	44.0	36.1	29.2
Federal sources[c]	%	63.0	(67.0)	60.7	63.1	56.0	63.9	70.8
NIH	%	47.3	(55.3)	45.9	45.0	40.3	50.0	54.7
ADAMHA	%	2.1	(2.4)	1.3	2.2	3.5	1.5	2.3
HRA	%	0.8	(0.8)	1.0	0.7	1.0	1.0	0.5
Other federal sources	%	19.1	(15.5)	19.7	23.0	17.1	18.6	17.4
Survey item responses	N	3742	(1891)	619	648	683	694	1098
Estimated total researchers	N	11972	(5452)	2366	2343	2363	2461	2439

[a] See Appendix B5 for comparable data in each of the basic biomedical fields specified in the survey taxonomy.

[b] Includes all biomedical Ph.D. recipients who received predoctoral training grant or fellowship support from NIH, ADAMHA, or HRA.

[c] Individuals with support from more than one agency are counted only once in the aggregated total for all federal sources.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

TABLE 3.4 1971-75 Biomedical Ph.D.'s Taking Postdoctoral Appointment within a Year after Earning Doctorate[a]

				Fiscal Year of Doctorate				
		Total	Trainees/ Fellows[b]	1971	1972	1973	1974	1975
Held postdoctoral appointment	%	55.7	(65.2)	55.8	52.6	53.6	54.0	62.3
Survey item responses	N	4429	(2206)	725	769	801	841	1293
Estimated total Ph.D.'s	N	14288	(6425)	2792	2842	2799	2982	2873
Reason for taking postdoctoral appointment								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Additional research experience	%	61.9	(60.9)	63.5	61.1	61.2	62.0	61.9
Switch to another field of research	%	16.1	(15.8)	15.8	20.0	13.4	16.6	15.0
Inability to find suitable employment	%	13.3	(11.7)	13.0	13.2	15.1	12.4	12.9
Other	%	8.7	(11.6)	7.7	5.8	10.4	9.0	10.2
Survey item responses	N	2323	(1336)	360	378	415	404	766
Estimated total on postdocs	N	7957	(4188)	1558	1496	1501	1611	1791

[a] See Appendix B10 for comparable data in each of the basic biomedical fields specified in the survey taxonomy.

[b] Includes all biomedical Ph.D. recipients who received predoctoral training grant or fellowship support from NIH, ADAMHA, or HRA.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

TABLE 3.5 Tenured and Postdoctoral Positions Currently Held by 1971-75 Biomedical Ph.D.'s in the Academic Sector[a]

			Fiscal Year of Doctorate				
		Total	1971	1972	1973	1974	1975
Type of academic position							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Tenured	%	12.0	28.0	16.3	10.3	4.0	2.7
Tenure track	%	43.8	46.3	53.7	49.9	43.0	27.5
Postdoctoral appointment	%	25.0	6.4	10.1	19.8	33.2	52.4
Other nontenured	%	19.3	19.3	19.9	20.0	19.7	17.4
Survey item responses	N	2882	480	471	529	533	869
Estimated total employed in academic sector	N	9463	1843	1789	1890	1968	1973
Fraction of total research time contributed by postdocs[b]		0.424	0.118	0.191	0.356	0.532	0.733

[a] See Appendix B12 for comparable data in each of the basic biomedical fields specified in the survey taxonomy.

[b] Computed as follows: $(X_p \cdot Y_p / X_t \cdot Y_t)$

where: X_p = total graduates on postdoctoral appointments

Y_p = average percentage of time these postdocs devote to research

X_t = total graduates employed (including postdocs)

Y_t = average percentage of time all employed graduates devote to research

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

TABLE 3.6 Postdoctoral Appointments Currently Held by 1971-75 Biomedical Ph.D.'s[a]

		Fiscal Year of Doctorate[b]		
		1971	1972	1973
Current postdoctorals appointees who:				
Prolonged present appt. because of difficulty in finding job	%	50.2	68.6	59.1
Held present appt. longer than 36 months	%	78.4	71.8	62.0
Survey items responses	N	35	57	114
Estimated total postdocs.	N	153	220	445

[a] See Appendix B13 for comparable data in each of the basic biomedical fields specified in the survey taxonomy.

[b] Data for 1974-75 Ph.D.'s have not been reported since they could not have held postdoctoral appointments more than two years.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

- More than three-fifths of the 1971-73 graduates holding postdoctoral appointments at the time of the survey indicated that they had prolonged their appointments because of difficulty in finding suitable employment, and 24 percent had held postdoctoral appointments longer than three years.

- During a period (1972-75) when the number of biomedical Ph.D's awarded annually had increased very little, the total number of persons holding postdoctoral appointments expanded at an annual rate of more than 13 percent. This rapid growth (from 3,039 appointees in 1972 to 4,455 in 1975)[3] came as a result of increases in both the number of graduates taking postdoctorals and the length of these appointments.

It is apparent that rapid expansion in the number of postdoctoral appointments has provided many recent graduates with temporary positions that fully utilized their research training. The Committee concluded, however, that such expansion cannot and should not continue in the future.

As noted in Chapter 2, survey findings also provided evidence of considerable mobility among basic biomedical fields.[4] A total of 39 percent of the 1971-75 graduates were employed or held postdoctoral appointments in fields outside their doctoral specialties, and less than 70 percent considered their employment fields closely related to their Ph.D. specialties (Table 3.7). Most of the field-switching has been from one biomedical specialty to another. Only 8 percent of the recent graduates had moved into fields outside the biomedical science area, and less than 5 percent felt that their employment fields were not at all related to their doctoral training. These findings confirmed the Committee's general impression that individuals with doctoral training in a basic biomedical field are often qualified to move into many other biomedical fields with minimal, if any, formal retraining. It is not possible, from the analysis available, to make a more definitive statement about field-switching or to state the limitations of this generalization.

Biomathematics/biostatistics and epidemiology stood out as important exceptions. These are largely methods fields and individuals with doctoral training in these fields can be involved in a wide variety of activities and still consider themselves to be working within their doctoral fields. Survey findings revealed that 81 percent of the

TABLE 3.7 Relevance of Current Employment or Postdoctoral Appointment Specialty to Doctorate Specialty of 1971-75 Biomedical Ph.D.'s

		Fiscal Year of Doctorate					
		Total	1971	1972	1973	1974	1975
Employed in:							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Ph.D. specialty field	%	61.0	61.6	60.4	60.4	64.3	58.2
Other biomedical field	%	31.4	32.6	32.5	30.8	28.0	33.6
Other field	%	7.6	5.8	7.1	8.9	7.7	8.2
Ph.D. field and employment field were considered							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Closely related	%	69.7	70.8	68.5	71.3	68.9	69.3
Somewhat related	%	25.7	25.2	26.4	23.6	26.3	27.1
Not at all related	%	4.5	4.1	5.1	5.1	4.8	3.6
Survey item responses	N	4167	684	717	765	781	1220
Estimated total employed	N	13671	2676	2709	2706	2840	2740
Postdoctoral appointment in:							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Ph.D. specialty field	%	57.7	61.5	48.2	55.7	63.9	55.8
Other biomedical field	%	39.2	32.4	50.9	41.9	33.6	40.5
Other field	%	3.1	6.1	0.9	2.5	2.6	3.6
Ph.D. field and postdoctoral field were considered							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Closely related	%	68.6	79.1	55.0	71.2	69.5	68.3
Somewhat related	%	29.0	20.9	40.4	26.5	28.3	29.4
Not at all related	%	2.3	0.0	4.6	2.2	2.3	2.3
Survey item responses	N	940	34	57	113	198	538
Estimated total postdocs.	N	2862	153	220	445	789	1255

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[a] See Appendixes B15 and B16 for comparable data in each of the basic biomedical fields specified in the survey taxonomy.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

graduates in biomathematics/biostatistics and 78 percent of the graduates in epidemiology have remained in their fields of doctoral training (Appendix B15). Findings also showed that almost one-half of those employed in biomathematics/biostatistics and epidemiology held doctorates in other fields (Appendix B17). Many of those switching into these two fields had earned their Ph.D.'s in fields outside the basic biomedical sciences (e.g., statistics).

Much of the additional training needed to change fields of research has been acquired on postdoctoral appointments. Almost 40 percent of those on postdoctoral appointments in October 1976 were engaged in research training in fields outside their Ph.D. specialties (Table 3.7), and more than 16 percent of those who have held postdoctoral appointments indicated that their primary motivation in taking their first appointment was to switch into other fields of research (Table 3.4).

Despite the large fraction of 1971-75 Ph.D. recipients in biomedical sciences employed in fields outside their doctoral fields, very few felt that they were not utilizing their graduate training. Survey results reported in Table 3.8 showed:

- Of the 3,200 respondents employed in full-time positions (excluding postdoctoral appointments), more than 80 percent considered their doctorates essential in attaining their present positions, while only 3 percent indicated that their degrees were unimportant.

- More than 85 percent of these respondents felt that doctoral or postdoctoral training was required to fulfill present job responsibilities adequately.

- More than 62 percent considered their predoctoral research experience essential to their present positions, while less than 4 percent found this experience not at all useful.

An examination of employment patterns within each biomedical field revealed that the vast majority of graduates in every field appeared to be utilizing their doctoral training. In fact, no biomedical field was found to have an unemployment rate substantially greater than the overall average of 2 percent, and more than three-fourths of the graduates in each field[5] considered their doctoral degree or research training essential to their present employment situation

TABLE 3.8 Relevance of Doctoral Degree, Training, and Research Experience to Present Employment Situation of 1971-75 Biomedical Ph.D.'s[a]

				Fiscal Year of Doctorate				
		Total	Trainees/ Fellows[b]	1971	1972	1973	1974	1975
In attaining present position, doctorate was considered:								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Essential	%	80.5	(82.6)	86.0	83.4	81.8	74.2	73.1
Helpful	%	15.3	(13.9)	10.8	13.0	14.7	20.3	21.1
Unimportant	%	3.2	(2.6)	2.3	2.8	2.7	4.7	4.3
Uncertain	%	0.9	(0.9)	0.9	0.8	0.8	0.8	1.4
Survey item responses	N	3211	(1543)	651	659	642	588	671
Estimated total full-time employed	N	10576	(4595)	2475	2428	2195	2026	1452
Necessary training required to fulfill present job:								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Postdoctoral	%	27.1	(34.9)	32.1	31.9	26.1	23.4	17.4
M.D./Ph.D.	%	58.1	(52.7)	58.1	55.6	61.5	54.9	61.6
M.S./M.A.	%	10.1	(8.0)	5.5	8.1	8.9	16.3	14.5
B.S./B.A.	%	3.0	(2.6)	2.3	3.6	2.6	2.8	4.3
Other training	%	1.6	(1.8)	2.1	0.8	0.9	2.6	2.2
Survey item responses	N	3199	(1535)	650	653	642	583	671
Estimated total full-time employed	N	10576	(4595)	2475	2428	2195	2026	1452
Predoctoral research experience considered:								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Essential	%	62.1	(65.1)	65.6	63.9	62.1	59.1	56.9
Helpful	%	32.1	(29.4)	30.2	29.4	31.3	35.3	36.8
Not needed	%	3.8	(3.8)	2.7	3.8	4.3	4.7	3.6
Uncertain	%	2.0	(1.9)	1.5	2.9	2.3	0.8	2.7
Survey item responses	N	3175	(1532)	649	646	638	582	660
Estimated total full-time employed	N	10576	(4595)	2475	2428	2195	2026	1452

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[a] See Appendixes B6, B7, and B8 for comparable data in each of the basic biomedical fields specified in the survey taxonomy.

[b] Includes all biomedical Ph.D. recipients who received predoctoral training grant or fellowship support from NIH, ADAMHA, or HRA.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

(Appendixes B2 and B9). Only 4 percent did not consider their doctorates useful.

The Committee found evidence to suggest that the employment prospects have been better in some fields than in others. Data were examined to identify shortage fields. Table 3.9 shows examples of fields[6] in which there were indications of better than average employment opportunities. The two lists reported were composed by quite different criteria. List A consists of those fields with the lowest percentages of graduates either unemployed or not utilizing their doctoral training. List B consists of fields that were found to have the smallest percentages of graduates working in unrelated fields and the largest net influx from graduates trained in other doctoral specialties. The Committee does not believe that it is feasible at this time to identify with confidence one comprehensive list of shortage fields in the basic biomedical sciences. The above analysis is inherently subject to serious limitations since field-switching occurs so frequently that initial specialization is misleading. In many fields temporary shortages may have been met through retraining at the postdoctoral level.

Despite these limitations, the Committee does recognize that in biomathematics/biostatistics and epidemiolcgy special considerations exist. Very few graduates in these fields have encountered any difficulty in finding employment. As mentioned earlier, most have taken positions in their doctoral fields. Also, there has been very little opportunity for individuals to pursue postdoctoral (i.e., post-Ph.D.) training in biomathematics/biostatistics and epidemiology.

While the extent of involvement in health-related research has been great for all recent Ph.D. recipients in the biomedical fields, survey findings revealed that those who received predoctoral support from NIH, ADAMHA, or HRA training programs were especially likely to have pursued research careers in health. Specifically, a comparison of federal trainees and other biomedical graduates showed:

- Graduates of these federal training programs have devoted more time to research (Table 3.2).
- A significantly larger fraction of research performed by these graduates was supported by NIH and other federal agencies (Table 3.3).
- A much greater proportion of these graduates elected to continue training at the postdoctoral level (Table 3.4).

TABLE 3.9 Summary of Market Indicators in Selected Biomedical Fields Based on Two Different Criteria[a]

List A	Percent of Time Since Graduation Unemployed and Seeking Employment (%)	Percent of Graduates Not Using Ph.D. Training in Present Position (%)
Ph.D. field		
Total biomedical sciences[b]	1.5	4.0
Animal sciences	0.0	2.5
Cell biology	1.0	2.6
Developmental biology	1.3	1.5
Environ. hlth. and toxicology	0.5	0.0
Epidemiology	0.2	2.9
Pathology	0.5	2.9
Pharmacology and pharm. sci.	1.3	1.8

List B	Percent of Graduates with Ph.D. Field Unrelated to Employment Field (%)	Ratio of Employment Field to Ph.D. Field Size[c]
Ph.D. field		
Total biomedical sciences[b]	4.5	0.979
Animal sciences	1.6	1.500
Biomath/biostatistics	3.2	1.561
Epidemiology	1.9	1.444
Neurobiology	2.7	1.459
Nutrition and food sciences	0.0	1.223
Pathology	1.6	1.204

[a] Data included in the four columns above are from Appendixes B1, B9, B15, and B17.

[b] Total figures reflect averages across all 22 basic biomedical fields and not just the fields listed here.

[c] Calculated by dividing the total number of graduates employed in a particular field by the total with Ph.D.'s in that field.

- More of the federally supported doctorate recipients considered their predoctoral research experience essential to their present position (Table 3.8).

In addition, an earlier report (NRC, 1976b) on the career patterns of biomedical Ph.D.'s showed that in each age cohort, the proportion whose primary activity was research or development was about 10 percentage points or higher for former NIH fellows and trainees than for those without such support.

These findings upheld the Committee's conviction that federal funding for predoctoral research training has been generally directed to the group of individuals most likely to make significant contributions in areas of health research. Nevertheless, it must be acknowledged that many of the same individuals probably would have been able to find other means of support if federal training funds had not been available.

RECENT EXPANSION OF THE BIOMEDICAL SCIENCE LABOR FORCE

Although most recent graduates in the biomedical sciences currently hold positions appropriate to their training, evidence was found that indicated that some important changes have occurred within the labor market. While the number of persons who earned biomedical science doctorates each year[7] nearly tripled between 1960 and 1970, the rate of growth in doctorates has declined dramatically since 1971 (Figure 3.1 and Appendix B21). Indeed, the number of degrees awarded annually actually has declined recently in some well-established disciplines. Over this period of rapid growth (1960-70), there was a parallel increase in the proportion of doctorate recipients who had no specific employment opportunities at the time of graduation. This trend has been interpreted[8] as an indication that demand for biomedical research personnel was starting to diminish at the beginning of this decade. Since 1971, however, the proportion of biomedical Ph.D.'s unable to find employment before graduation has remained steady at approximately 12 percent (Table 3.10), whereas in other areas of science it has continued to grow. One explanation for this finding may be that the proportion of biomedical Ph.D.'s who take postdoctoral appointments has increased significantly, especially since 1970. By 1976, 62 percent planned postdoctoral study after graduation, compared to 51 percent five years earlier (Table 3.10). During this same period the proportion of graduates finding regular academic positions decreased from 36 to 22 percent. As remarked earlier in this chapter, the availability of postdoctoral

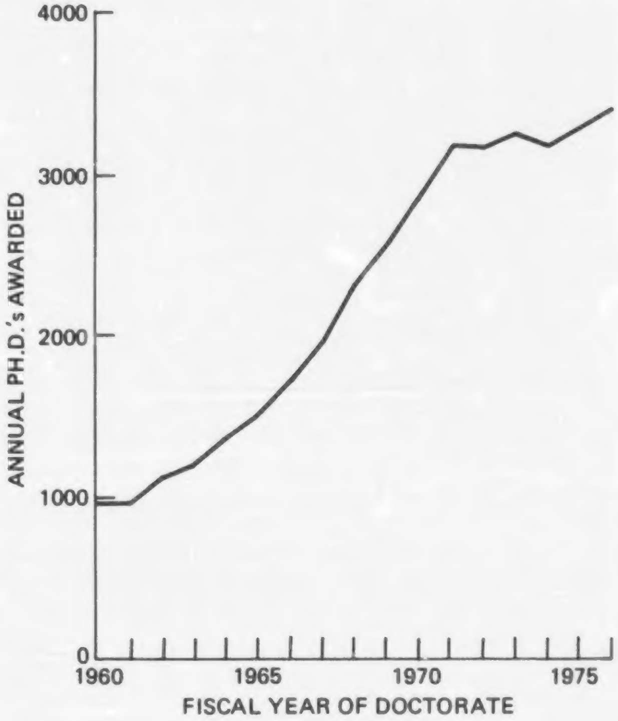


FIGURE 3.1 Total annual Ph.D.'s awarded in biomedical sciences. See footnote (a) in Table 3.10. Data from NRC, Survey of Earned Doctorates, Washington, D.C., 1958-76.

TABLE 3.10 Employment Plans of 1969-76 Biomedical Ph.D.'s[a]

		Fiscal Year of Doctorate							
		1969	1970	1971	1972	1973	1974	1975	1976
Job prospects at completion of Ph.D. program									
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Firm commitment	%	81.0	80.7	77.3	76.4	76.6	75.4	77.8	77.7
Tentative plans	%	9.5	9.2	10.0	9.5	10.9	11.3	9.9	10.0
Seeking position	%	8.8	9.7	12.1	13.4	12.0	13.1	11.8	11.9
Other	%	0.7	0.4	0.6	0.7	0.6	0.2	0.5	0.3
Survey item responses	N	2400	2750	2989	2976	3068	2889	3090	3166
Total Ph.D.'s[a]	N	2573	2871	3188	3176	3273	3195	3286	3371
Postgraduation plans									
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total planning postdoc. appt.	%	46.1	51.8	51.5	53.7	53.4	54.1	60.3	62.1
Fellow/trainee	%	32.6	37.5	36.0	35.1	32.8	29.6	36.5	39.1
Research associate	%	11.6	11.1	12.5	13.8	14.9	18.1	17.3	16.6
Other	%	1.9	3.2	3.0	4.9	5.7	6.4	6.5	6.3
Total planning employment	%	53.6	47.9	48.1	46.0	46.0	45.5	38.7	36.7
Academic sector	%	36.1	31.0	31.8	28.9	28.4	26.6	22.1	21.7
Business	%	7.6	6.6	6.1	4.6	6.3	7.3	5.5	5.6
Government	%	6.6	6.8	7.1	7.3	7.0	7.3	7.3	5.8
Other	%	3.3	3.5	3.1	5.2	4.3	4.3	3.9	3.7
Other plans	%	0.3	0.3	0.4	0.3	0.6	0.4	1.0	1.2
Survey item responses[b]	N	2171	2472	2609	2557	2683	2505	2710	2778
Total Ph.D.'s	N	2573	2871	3188	3176	3273	3195	3286	3371

[a] The total Ph.D.'s reported here exceeds the 1971-75 Ph.D. estimates presented earlier because the set of basic biomedical fields used from the Survey of Earned Doctorates, from which data in this table were derived, included a somewhat broader population than the set developed for the Committee's survey of recent doctorate recipients. A comparison of these two taxonomies is given in Chapter 2. See Appendix B21 for data on Ph.D.'s awarded in each biomedical field.

[b] Only responses from graduates with definite or tentative employment plans were counted here.

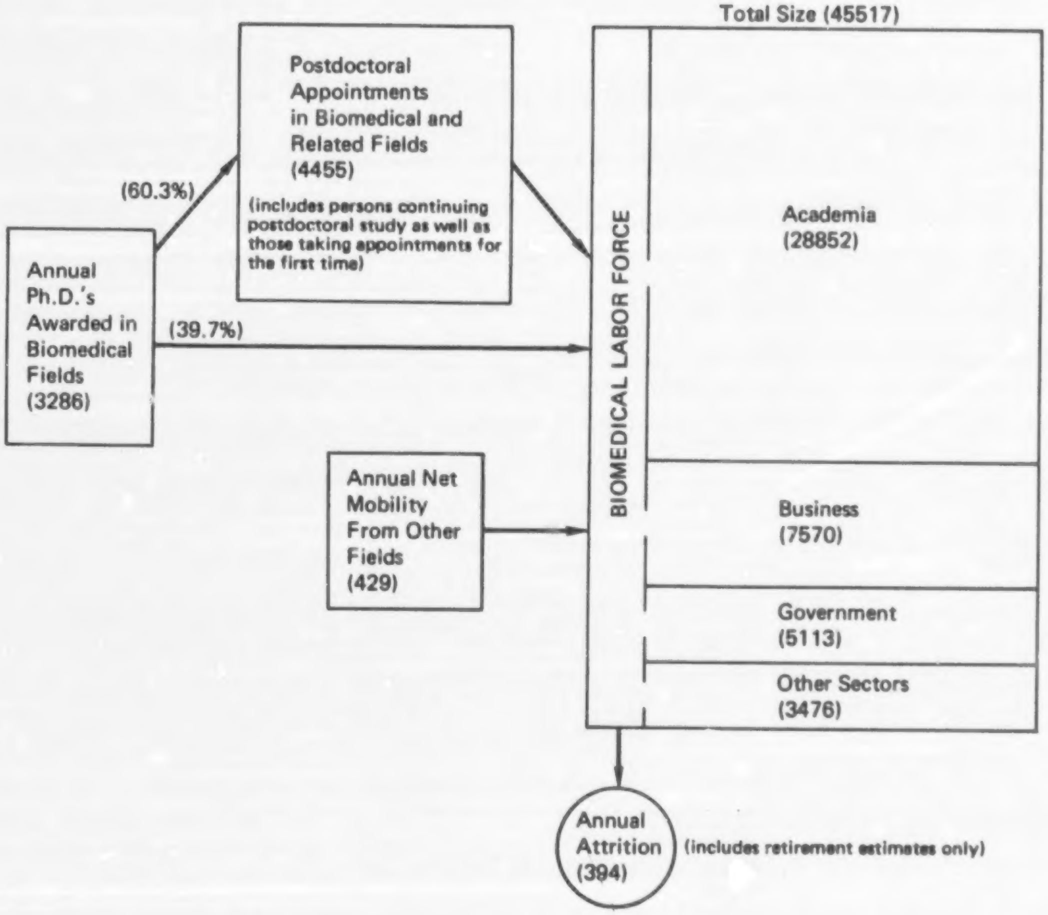
SOURCE: NRC, Survey of Earned Doctorates, Washington, D.C., 1969-76.

support seems to have provided temporary appointments for many biomedical doctorate recipients who might otherwise have encountered some difficulty in finding more permanent academic positions that fully utilize their research training.

The dynamics of the biomedical labor force are represented in a simplified model of manpower flow, which shows how the Committee believes the system is currently functioning (Figure 3.2). In the absence of consistent longitudinal data regarding the numbers completing postdoctoral appointments, numerical estimates are necessarily approximate, but the pattern of flow seems clear even if the precise details are not. Four factors have contributed to the growth and attrition in the labor force: (1) the number of new Ph.D. recipients entering the labor force, (2) the number of earlier graduates who were completing postdoctoral appointments, (3) the net total number of scientists switching into biomedical employment from other areas, and (4) the number of older scientists lost through death or retirement. Estimates of these figures have been made for manpower flows in 1975.

Between 1972 and 1975 the biomedical labor force (defined to exclude postdoctorals[9]) has expanded at an annual rate of almost 9 percent (Table 3.11). If all the doctorate recipients each year had entered the labor force directly, their number alone would have provided an annual growth rate of approximately 7 percent. But they did not. In 1975, for example, 60 percent of the graduates took postdoctoral appointments. Hence, only about one-half of the growth in the 1975 biomedical labor force was attributable to freshly graduated Ph.D.'s taking jobs. About one-third of the growth is attributable to individuals completing postdoctoral appointments. The remainder of the growth, about 5 percent, resulted from a net influx into the biomedical area of scientists with doctoral training in other areas.

While precise estimates are unattainable because of inadequate historical data, it is clear that in recent years more persons have been undertaking postdoctoral study than completing it, and that the pool of potential members of the biomedical labor force has been growing. Furthermore, in 1975 the number of scientists with doctorates in chemistry, physics, and other related areas employed in basic biomedical sciences was almost twice as large as the number of biomedical Ph.D.'s working in other areas (Table 3.12). Finally, the total annual attrition due to death and retirement has been small and probably will not exceed Cartter's (1976, p. 121) estimate of 1.3 percent in the near future. As a consequence of all these factors, the Committee anticipates continued expansion in the available supply of doctoral personnel in the basic biomedical sciences over the near term.



Total Size (45517)
Postdoctoral Appointments in Biomedical and Related Fields (4455)
(includes persons continuing postdoctoral study as well as those taking appointments for the first time)
(60.3%)
Annual Ph.D.'s Awarded in Biomedical Fields (3286)
(39.7%)
Annual Net Mobility From Other Fields (429)
BIOMEDICAL LABOR FORCE
Academia (28852)
Business (7570)
Government (5113)
Other Sectors (3476)
Annual Attrition (394)
(includes retirement estimates only)

FIGURE 3.2 Components contributing to the annual growth of the biomedical science labor force. Figures in parentheses represent estimated sizes in 1975. From NRC, Survey of Doctorate Recipients, Washington, D.C., 1975.

TABLE 3.11 Number of Persons in Sectors of the Biomedical Ph.D. Labor Force and Research Component,[a] 1972-75

	1972[b]		1973		1974		1975	
	N	%	N	%	N	%	N	%
Total Ph.D. labor force	35779	100.0	38784	100.0	42614	100.0	45517	100.0
Academic sector	22708	63.5	24469	63.1	27236	63.9	28852	63.4
Business	5232	14.6	5752	14.8	6867	16.1	7570	16.6
Government	4137	11.6	4554	11.7	4887	11.5	5113	11.2
Other sectors	3459	9.7	3592	9.3	3328	7.8	3476	7.6
Unemployed	243	0.7	417	1.1	296	0.7	506	1.1
Total research component	29761	100.0	31646	100.0	33464	100.0	35489	100.0
Academic sector	18998	63.8	20210	63.9	21769	65.1	22992	64.8
Business	4489	15.1	4811	15.2	5340	16.0	5869	16.5
Government	3638	12.2	3932	12.4	4069	12.2	4258	12.0
Other sectors	2636	8.9	2693	8.5	2286	6.8	2370	6.7
Survey item responses	6666		7233		7577		8082	

[a] Labor force includes persons employed in positions other than postdoctoral appointments as well as unemployed persons who are seeking positions. The research component constitutes those in the labor force who considered research their primary or secondary work activity.

[b] Estimates for a particular year include individuals who had received doctorates *prior* to that fiscal year.

SOURCE: NRC, Survey of Doctorate Recipients, Washington, D.C., 1973; 1975.

TABLE 3.12 Field Mobility of Ph.D.'s into and out of Basic Biomedical Sciences, 1972-75

	1972		1973		1974		1975	
	N	%	N	%	N	%	N	%
Total active biomedical Ph.D.'s	[illegible]572	100.0	34930	100.0	38710	100.0	41184	100.0
Employed in biomedical area	27279	83.7	29094	83.3	32847	84.9	34701	84.3
Employed in other area	5050	15.5	5419	15.5	5567	14.4	5977	14.5
Unemployed	243	0.7	417	1.2	296	0.8	506	1.2
Total employed in biomedical area	35536	100.0	38367	100.0	42318	100.0	45011	100.0
Ph.D. in biomedical area	27279	76.8	29094	75.6	32847	77.6	34701	77.1
Ph.D. in other area	8257	23.2	9273	24.1	9471	22.4	10310	22.9
Survey item responses	6333		6831		7178		7647	

[a] Estimates for a particular year include individuals who had received doctorates prior to that fiscal year.

SOURCE: NRC, Survey of Doctorate Recipients, Washington, D.C., 1973; 1975.

OUTLOOK FOR BASIC BIOMEDICAL SCIENCES

Because of the time required for the training process, many of the trainees and fellows currently participating in the training programs will be seeking positions in the biomedical labor force several years from now. In making its recommendations, the Committee must try to anticipate the labor market conditions that the trainees are likely to encounter at the completion of their training. The outlook presented below for biomedical Ph.D.'s has been developed from the Committee's view of the important determinants of supply and demand in the academic market and some assumptions about their future behavior.

A key factor affecting the future academic demand for biomedical Ph.D.'s is the expected behavior of college and university enrollments in biomedical courses. (Since these are not available directly, they must be estimated from bioscience B.A. degrees awarded.) In the short run, the effect of increased enrollment is increased demand for faculty. In the long run the effect is generally an increase in supply, but this effect is dependent on Ph.D. completion rates.

During 1971-75, medical and dental school enrollments increased at more than 6 percent per year, and biomedical graduate enrollment has increased at more than 4 percent per year (Table 3.13). The fastest growing sector in biomedical sciences education is apparently in other health professional schools (nursing, public health, veterinary medicine, optometry, pharmacy, etc.) where enrollment has grown at more than 20 percent per year since 1971 (Table 3.13).

Cartter (1976) has made a detailed analysis of aggregate enrollment trends in higher education, based primarily on demographic changes and projected them to the year 2000. His projections indicate that total full-time equivalent graduate and undergraduate enrollment in higher education will grow at about 2.1 percent per year between 1975 and 1982. After 1982, enrollment is expected to decline steadily at just under 1 percent per year until 1990 when it would begin to increase again, rising in the year 2000 only to about the 1979 level (Cartter, 1976, pp. 89-91). Enrollment in biomedical fields may change at a faster or slower rate than this, but the trend is not yet clear. Accordingly, variations of Cartter's estimates have been incorporated into the projections that follow.

The demand for biomedical Ph.D.'s is also affected by R and D expenditures. In current dollars, national expenditures for health-related research show very little change in the substantial 14.7 percent annual rate of growth that has been occurring since 1952. However, in real terms, the annual rate of growth has been far below that since 1970. Over the period 1971-75, real national expenditures for health-related research have grown only at an annual

TABLE 3.13 Current Trends in Supply/Demand Indicators for Biomedical Science Ph.D.'s

	1971	1975	Average Annual Growth Rate 1971-75
Supply indicators:			
Ph.D. production	3,188	3,286	0.8%
Postdoctoral appts.	3,039 (1972)	4,455	13.6% (1972-75)
Demand indicators:			
National expenditures for health related R and D (1967 $)	$2.54 billion	$2.93 billion	3.6%
Life science R and D expenditures in colleges and universities (1967 $)	$1.04 billion	$1.21 billion	3.8%
NIH research grant expenditures (1967 $)	$505 million	$683 million	7.9%
Labor force:			
Biomedical Ph.D.'s employed in colleges and universities (excluding postdoctorals)	22,708 (1972)	28,852	8.3% (1972-75)
Biomedical enrollments:			
First year graduate	17,245	20,694	4.7%
Total graduate	32,603	38,314	4.1%
Health professional schools (except medical and dental)	14,242	30,378	20.9%
Medical and dental schools	57,040	73,700	6.6%
Estimated undergraduate[a]	550,958	736,648	7.5%
Total biomedical and health professions graduate and undergraduate enrollment	654,843	879,040	7.6%

[a] Estimated by the formula $U_i = (A_{i+2}/B_{i+2})C_i$ where U_i = biomedical science undergraduate enrollments in year i; A_{i+2} = biomedical B.A. degrees granted in year i+2; B_{i+2} = total B.A. degrees granted in year i+2; C_i = total undergraduate enrollments in year i.

SOURCES: NRC (1973, 1975d), NSF (1976), U.S. Office of Education (1959-75), NIH (1966-75).

rate of 3.6 percent. Inflation has similarly affected health-related research expenditures by industry and the federal government as shown in Figure 3.3.

Over the period 1961-75, the ratio of biomedical Ph.D.'s employed in higher education to total graduate and undergraduate enrollment in the biomedical sciences is highly correlated with real expenditures for life science R and D. This implies that projections of academic demand for biomedical Ph.D.'s should be based on both expected enrollment and R and D expenditures. A relationship between R and D expenditures and the Ph.D. faculty/student ratio in the biomedical sciences was developed from the data for 1961-75 and used to make projections of future Ph.D. faculty needs (Figure 3.4)[10]. Table 3.14 shows the projections to 1982 under a range of assumptions about life science R and D expenditures and biomedical science enrollments.

For R and D expenditures, Assumption I represents the high estimate based on a projection of continued growth at the 1971-75 rate of 3.8 percent per year in real terms. Assumption II represents the middle estimate based on a growth rate of 2 percent per year, while Assumption III represents the low estimate of no growth in real R an D expenditures from 1975 to 1982.

Enrollments similarly have been projected on the basis of a range of assumptions encompassing the extremes as seen from today's viewpoint. Under Assumption A (the high estimate), biomedical science and health profession enrollment will continue to grow at about 4.5 percent per year, reaching 1.2 million students by 1982. Assumption B, the middle estimate, adopts Cartter's projections of a 2.08 percent annual growth rate. Assumption C represents the low estimate on biomedical science and health professions enrollment--essentially no growth from 1975 to 1982.

The combination of Assumptions I and A produces the highest estimated number of faculty required in 1982 due to expansion alone. Under these assumptions, biomedical science and health profession faculty would increase at an annual rate of 6 percent, or an average annual increment of 2,066 positions. The lowest projection, of course, results from the lowest combination of Assumptions III and A, which translates to an average annual increment in biomedical Ph.D. faculty of only 123 positions. The middle position, represented by the IIB combination, would project a 3.1 percent annual growth rate in Ph.D. faculty, or an annual increase of 968 positions.

In addition to the estimated faculty growth due to expansion of enrollment and R and D expenditures, faculty positions become available due to death and retirement. Cartter (1976, p. 14) has estimated these annual replacement needs at about 1.3 percent of the total faculty in higher education between 1975 and 1982. Applying this rate to the average biomedical Ph.D. faculty size based on the data in Table 3.14, we derive in Table 3.15 the expected annual

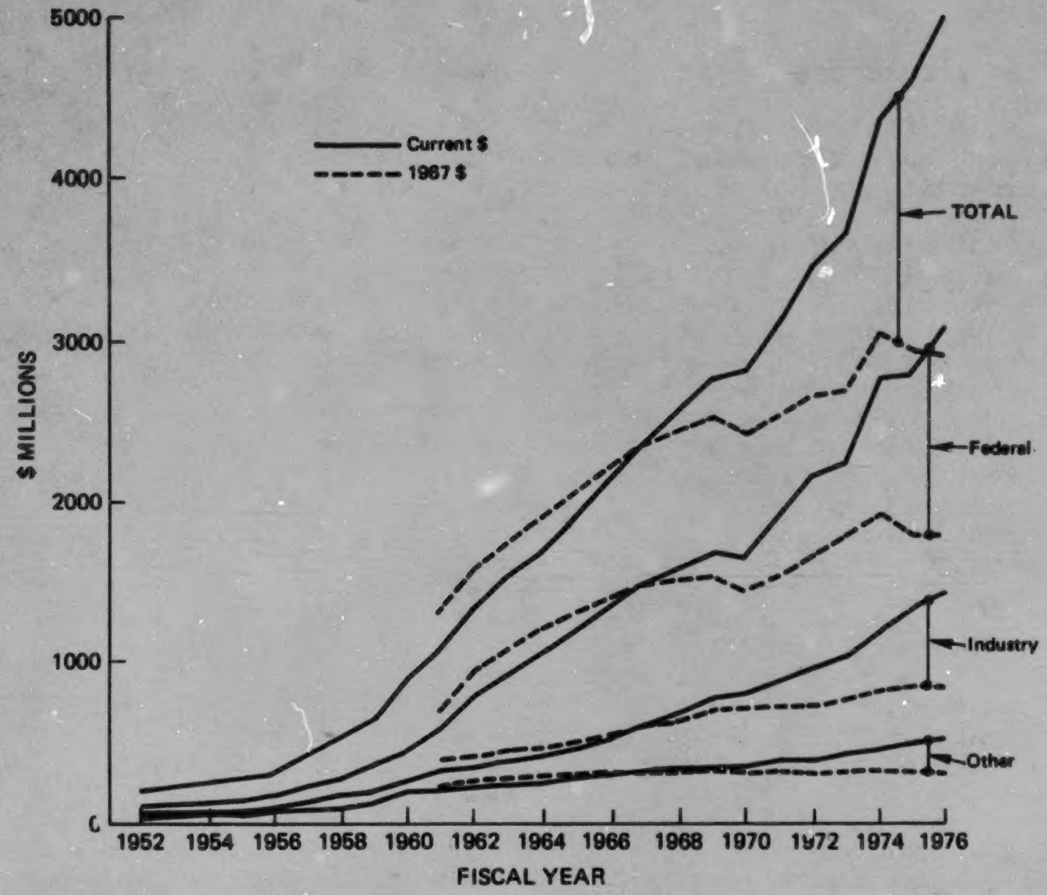
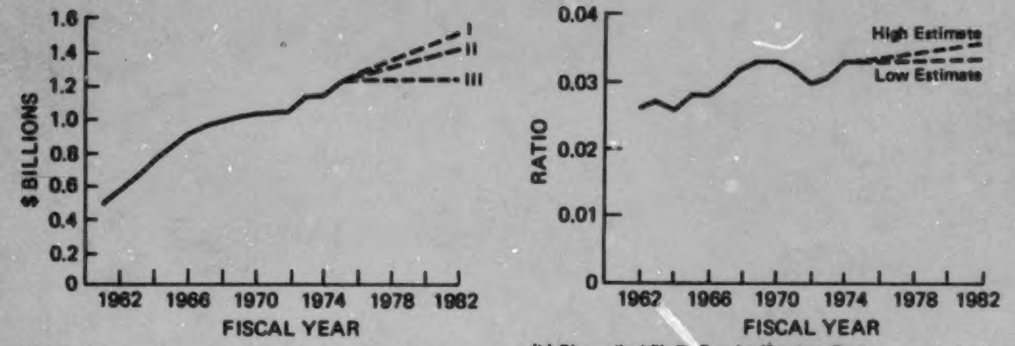
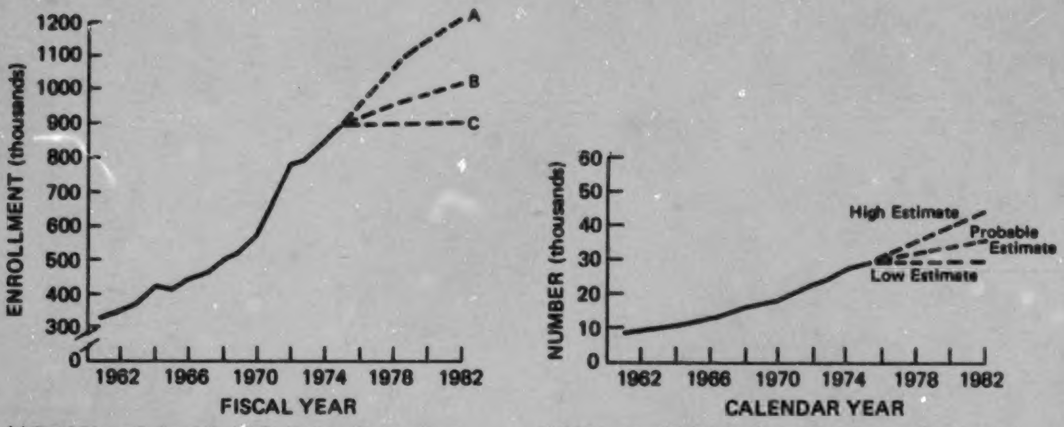


FIGURE 3.3 National support for medical and health-related research. Derived from tabulations provided by NIH, Division of Research Resources Analysis.



(a) Life Sciences R and D in Colleges and Universities (1967 $)

(b) Biomedical Ph.D. Faculty/Student Ratio



(c) Total Biomedical and Health Professions Graduate and Undergraduate Enrollment

(d) Biomedical Ph.D.'s Employed in Colleges and Universities

FIGURE 3.4 Biomedical enrollment, R and D expenditures, and academic employment, 1961-75, with projections to 1982. Based on data from NRC (1973, 1975d), NSF (1956-70, 1976), and U.S. Office of Education (1959-75). See also Appendixes D1 and D2.

TABLE 3.14 Projected Growth in Biomedical Science Ph.D. Faculty, 1975-82, Based on Projections of Enrollment and R and D Expenditures

Assumptions about Graduate and Undergraduate Enrollments in the Biomedical Sciences and Health Professions		Assumptions about Real R and D Expenditures in the Life Sciences in Colleges and Universities		
		I Will continue to grow at 3.8%/yr 1980 value = $1.45 billion[a]	II Will grow at 2%/yr 1980 value = $1.33 billion[a]	III No growth from 1975 level 1980 value = $1.21 billion[a]
A. Will grow at 4.5%/yr. to 1.2 million by 1982	Expected size of biomedical faculty (F) in 1982	43,311	41,911	40,510
	Annual growth rate of F, 1975-82	6.0%	5.5%	5.0%
B. Will grow at the 2.08%/yr rate projected by Allan Cartter, reaching 1.02 million by 1982	Expected size of biomedical faculty (F) in 1982	36,815	35,634	34,434
	Annual growth rate of F, 1975-82	3.5%	3.1%	2.6%
C. Essentially no growth from 1975 to 1982, 1982 value = 880,000	Expected size of biomedical faculty (F) in 1982	31,762	30,735	29,708
	Annual growth rate of F, 1975-82	1.4%	0.9%	0.4%

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[a] These projections are based on a relationship between F/S and R and D expenditures with a two-year lag; therefore, the estimated 1982 value of F/S is derived from the estimated value of R and D in 1980.

TABLE 3.15 Projected Average Annual Increment in Biomedical Science Ph.D. Faculty Due to Expansion and Replacement

Assumptions about Graduate and Undergraduate Enrollments in the Biomedical Sciences and Health Professions		Assumptions about Real R and D Expenditures in the Life Sciences in Colleges and Universities: I Will continue to grow at 3.8%/yr 1980 value = $1.45 billion[a]	II Will grow at 2%/yr 1980 value = $1.33 billion[a]	III No growth from 1975 level 1980 value = $1.21 billion[a]
A. Will grow at 4.5%/yr to 1.2 million by 1982	Average annual increment due to faculty expansion	2066	1866	1666
	Average annual replacement needs due to death and retirement[b]	469	460	451
	Expected average annual increment in biomedical Ph.D. faculty	2535	2326	2117
B. Will grow at the 2.08%/yr rate from 1975 to 1982 projected by Allan Cartter to 1.02 million by 1982	Average annual increment due to faculty expansion	1138	968	798
	Average annual replacement needs due to death and retirement[b]	.427	420	412
	Expected average annual increment in biomedical Ph.D. faculty	1565	1388	1210
C. Essentially no growth from 1975 to 1982 1982 value = 888,000	Average annual increment due to faculty expansion	416	269	123
	Average annual replacement needs due to death and retirement[b]	394	388	381
	Expected average annual increment in biomedical Ph.D. faculty	810	657	504

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[a] These projections are based on a relationship between F/S and R and D expenditures with a two-year lag; therefore, the estimated 1982 value of F/S is derived from the estimated value of R and D in 1980.

[b] Based on an estimated replacement rate of 1.3% annually due to death and retirement. See Allan Cartter (1976, p. 121).

increments in biomedical Ph.D. faculty due to expansion and replacement under the various assumptions.[11]

In recent years about 3,300 persons (Table 3.10) are receiving biomedical Ph.D.'s annually. Historically, between 60 percent and 65 percent of biomedical doctorates have been employed in colleges and universities (excluding postdoctorals--see Table 3.11). If this pattern continues, between 2,000 and 2,200 members of each new biomedical Ph.D. cohort would expect to find academic employment upon graduation. The projections in Table 3.15 indicate, however, that only under the high assumption about enrollment growth (Assumption A) would enough academic positions become available to accommodate all those who would seek them based on past preferences. The Committee believes that this is highly unlikely to occur.

If biomedical Ph.D. production should drop to a level of about 2,500 per year, the number seeking academic employment would be in the range of 1,500-1,625. The enrollment growth projected by Cartter to 1982 (Assumption B) would generate sufficient positions to essentially accommodate this number only under the high assumption about R and D spending. Again, the Committee believes that this is very unlikely to occur.

Under Assumption C of Table 3.15, the academic market would accommodate all those expected to seek such employment only if the annual production of biomedical Ph.D.'s dropped from the current level of 3,300 to below 1,000, about the number produced in 1961. Such a precipitous decrease is also quite unlikely.

Since the academic market is not expected to expand fast enough to absorb the biomedical scientists who will be seeking faculty positions in the next few years, the question arises how far the nonacademic market can be expected to expand. The Committee has no definite answer to this question at this time. It notes, however, two facts that bear on the question.

First, the survey results show that the proportion of the biomedical Ph.D. labor force employed by nonacademic organizations has been steady at about 37 percent for the last four years.

Second, although health-related R and D expenditures in the private sector are less than half the size of the federal expenditures, they are growing somewhat faster. From 1971 to 1975, real health-related R and D expenditures by private industry grew at an annual rate of 4.7 percent, while federal expenditures grew 3.9 percent annually, and total national expenditures grew only 3.6 percent per year. These data indicate that there has been no movement toward the nonacademic sector as yet for biomedical Ph.D.'s. The Committee intends to continue to monitor these trends.

ENRICHMENT

Historically, biomedical faculties have included many persons whose highest degrees were the M.S. or even B.S., especially at two-year colleges, community colleges, and secondary schools. In the future, however, as long as there is an abundance of Ph.D.'s seeking faculty positions, there would be a tendency to fill faculty openings with Ph.D.'s rather than with persons without doctorates--a process that has been termed "enrichment." The NSF (1975c) has found that this is what has actually occurred in four-year colleges and universities. In its report on doctorate supply and utilization the NSF states:

> since analyses of 1969-73 employment data of 4-year colleges and universities indicate that in net terms essentially all new faculty positions were filled by doctorates,...[our] models assumed that all of the growth and replacement of faculty positions in these institutions will be filled by doctorates in each of the science and engineering fields.

In view of these NSF findings, the trends observed up to 1975 in the number of Ph.D.'s employed in colleges and universities is a result of expansion and enrichment. Future enrichment depends on the number of non-Ph.D.'s presently on college faculties in the biomedical sciences.

The NSF (1975a, p. 6)[12] reports that in 1975 there were 38,000 biological scientists on college faculties, of which the Committee estimates that about 29,000 were Ph.D.'s (see Table 3.13). There are therefore some 9,000 faculty positions in the biomedical sciences occupied by non-Ph.D.'s for which biomedical science Ph.D.'s may compete. If, as expected, these positions become available by attrition at the rate of 1.3 percent per year, this would open up a maximum of 100 additional positions annually for biomedical science Ph.D.'s in the near future.

In addition to the 38,000 biological scientists, 63,000 individuals were employed in 1975 in the medical sciences at colleges and universities, of which 45,000 (full-time and part-time) held professional doctorates (M.D., D.D.S., etc.) (NSF, 1975b). Whether or not there is any potential for enrichment here is quite uncertain because the degree to which Ph.D.'s can substitute for M.D.'s on medical school faculties is largely unknown. In basic science departments there is probably a great deal of substitutability, but in clinical departments the degree of substitutability is likely to be much smaller.

Apparently the most significant sector for which doctorate holders may increase their share of the academic labor market at the expense of the nondoctorate faculty is in the two-year colleges. The NSF projects an increase in the enrichment rate here of almost 10 percent per year up to 1985.[13] It is not clear that this enrichment process would absorb all Ph.D.'s seeking academic appointments. That would depend on the rate of faculty expansion in relation to Ph.D. production, salaries of Ph.D.'s relative to persons without doctorates, the willingness of Ph.D.'s to accept appointments in two-year colleges, and the willingness of two-year colleges to accept Ph.D.'s. But the fact that many recent Ph.D. recipients have prolonged their postdoctoral study because of difficulty in finding suitable employment is an indication that the enrichment process cannot be totally relied on to provide the additional faculty positions (perhaps 500 per year) that appear to be needed to absorb all biomedical science Ph.D.'s who will be seeking academic careers.

RECOMMENDATIONS

Predoctoral Training Levels

In its deliberations, the Committee considered the survey data on employment and utilization, the manpower projections, the rapid growth of the number of postdoctoral appointments, and the experience of its own members. The Committee concludes that the current level of Ph.D. production in the basic biomedical sciences is somewhat high and can be reduced in such a way as not to affect the quality of training.

The Committee recognizes that there is always some uncertainty in projecting future needs. Predoctoral institutional training grant programs make a major contribution to the vigor and quality of American biomedical sciences. The Committee therefore also concludes that a sudden or drastic reduction in this support would be extremely unwise.

It is, of course, not possible to rely wholly on reductions in federal support to achieve desired reductions in the number of new Ph.D.'s. Many of the biomedical science graduate students are not supported by federal funds. Reducing federal training grants might even be counterproductive, given the evidence cited above that NIH trainees are more likely to remain in research and contribute to the advancement of science. The Committee therefore believes that it is imperative that all persons connected with graduate education in the biomedical sciences be made aware of the current employment situation, the accumulation of postdoctoral trainees, and the Committee's forecasts of future opportunities (see the section--"Acquisition and Dissemination of Employment/Utilization

Information to Individual Applicants and Academic Departments" in Chapter 9).

In its 1976 report, the Committee recommended a 10 percent reduction from the FY 1975 level in the number of federally funded predoctoral positions in the biomedical sciences for FY 1976, that is, a reduction from 6,003 to 5,400, as shown in Table 3.16. The number actually awarded in FY 1976 was much lower; in fact, only 4,449 awards were made. The Committee concludes that the number of biomedical doctorates awarded annually is still too high, and it now recommends a reduction in predoctoral awards to 4,250 for FY 1979. This number amounts to a 20 percent decrease from the 1976 recommended level and a reduction from the actual awards for FY 1976. The Committee believes it is unwise at this time to recommend larger reductions in predoctoral support.

Recommendation. The number of NIH/ADAMHA/HRA awards in the basic biomedical sciences should be reduced to 4,250 by FY 1979, a reduction of 20 percent from the FY 1976 level recommended by the Committee and a reduction of about 5 percent from the actual number of awards for FY 1976.

Postdoctoral Training Levels

Postdoctoral support is needed for the continuation of the advanced research training that is essential for a healthy research community. This training does not add to the size of the doctoral labor force in the biomedical sciences, but it does increase and redistribute technical skills as well as provide research opportunities. The Committee believes the number of postdoctoral awards recommended in its 1976 report was sufficient and the level should remain constant.

In contrast to the predoctoral situation, the actual level of postdoctoral awards classified in the biomedical sciences area for FY 1976 exceeded the Committee recommendations, with 3,767 actual awards as compared with 3,200 recommended. It is possible that some of these additional postdoctoral awards should properly be classified in the clinical sciences, as is suggested by the large reductions that occurred in postdoctoral support in that area in FY 1976. Before the aggregate number of postdoctoral awards is reduced, the agencies are urged to reexamine last year's classification of these awards to determine whether some should be reclassified under the clinical sciences. If reductions are made, they should be carried out in phases and in a way that avoids eliminating current programs.

TABLE 3.16 Committee Recommendations for NIH and ADAMHA Predoctoral and Postdoctoral Traineeship and Fellowship Awards in the Basic Biomedical Sciences

Agency Awards and Committee Recommendations	Fiscal Year 1975	1976	1977	1978	1979	1980	1981
Actual awards							
Total	*9199*	*8216*[a]					
Pre	*6003*	*4449*					
Post	*3196*	*3767*					
1976 recommendations							
Total		8600	8600	8600			
Pre		5400	5400	5400			
Post		3200	3200	3200			
1977 recommendations							
Total					7430	7450	7450
Pre					4250	4250	4250
Post					3200	3200	3200

[a] FY 1976 awards were reported in 1977 subsequent to the release of the 1976 report of the Committee.

Recommendation. The number of federally funded postdoctoral awards in the basic biomedical sciences should remain constant at 3,200 for FY 1979.

Training Grants and Fellowships

As in its 1976 report, the Committee recommends that the NIH support for predoctoral students remain primarily through institutional training grants which play a special role in basic biomedical research training. The long-range nature of these grants enables departments to plan effectively and to provide the stability and cohesiveness necessary for the establishment of an environment for high-quality research training. With these training grants, the aggregate of trainees over a period of time make more efficient use of concentrated resources, such as faculty and research equipment.

Most of the NIH predoctoral training grants awarded under the authority of the NRSA Act are now multidisciplinary in nature. These multidisciplinary training grants are especially useful in the support of multidisciplinary fields, such as toxicology and nutrition. However, as discussed in Chapter 9, the Committee believes that in some cases, single discipline training grants are more appropriate.

Although training grants are the preferred mechanism for establishing the environment for high-quality predoctoral training, there is also a place for predoctoral fellowship awards. Results of the Committee's survey of recent doctorate receipts indicated that 15 percent of the biomedical graduates received predoctoral training support from federal sources other than NRSA. The Committee believes that opportunities should exist for students to obtain funding that allows them to attend institutions and departments that do not have NIH training grant support. The NSF predoctoral fellowship program provides important support for this purpose.

The Committee recommends again this year that NIH support of postdoctoral training be predominantly in the form of individual fellowships. Postdoctoral training is undertaken on an individual basis, with less reliance on the department as a whole. A postdoctoral scientist is intensely involved in a research problem, usually working directly with one or two senior scientists. As a fellow, the young scientist has a wide choice of research fields, institutions, departments, and mentors.

Recommendation. The Committee recommends that institutional training grants be the primary mechanism for

NRSA support of predoctoral students in the basic biomedical sciences. Support of postdoctoral training, on the other hand, should utilize primarily the mechanism of individual fellowships.

Priority Fields for Research Training

The Committee believes that continued emphasis on quality and breadth of fundamental training is vital to scientific graduate education. In responding to the NRSA legislation, the Committee has attempted to identify priority fields of special emphasis for research training. However, field-switching data (see Table 3.7) support the previous conclusion that identification of specific fields for priority consideration should not be made at the predoctoral level. The high mobility from Ph.D. fields to employment fields found in the early stages of the careers of biomedical scientists would make it difficult to target training at the predoctoral level even if the Committee thought it wise to attempt to do so.

Two exceptions are the fields of biomathematics/biostatistics and epidemiology. Few graduates have left these fields, few hold postdoctoral positions, and few have encountered difficulty in finding employment. In fact, it appears that many positions in these fields have been filled by graduates from other fields, such as statistics, that are outside the biomedical sciences. The Committee recommends that the predoctoral support for these two fields not be reduced and that it continue at no less than the present level.

As a result of the high field mobility in the basic biomedical sciences, the Committee recommends that the NIH not identify specific fields or subject matter for predoctoral training in its announcement, except for the two fields mentioned above, and award training grants in health-related fields based on merit. However, in those cases where the agency concluded that it is desirable to describe in its announcement fields of predoctoral training that are of special interest to particular institutes, the Committee believes that the announcement should state explicitly that no field or subject matter which is within the broad area of the biomedical or behavioral sciences is excluded from consideration (see "Announcement Fields" in Chapter 9).

The Committee has carefully examined the available data for all fields identified in the basic biomedical science taxonomy in an attempt to specify priority fields for training at the postdoctoral level. In a subsequent discussion of the public meeting, it is noted that several speakers asked that their field be given special consideration for priority research training support. Those fields, as well as others, were examined by the Committee.

Differences among the indicators do occur and are useful in characterizing the field. It appears that there are no great shortages in any of these individual fields and that national needs for research training are being met by the present system of selection. The Committee concludes that specific numerical recommendations by field are not advisable because: (1) fields in the basic biomedical sciences do not exhibit large differences, as measured by the utilization and employment indicators of the survey of recent Ph.D. recipients; (2) fields in the basic biomedical sciences cannot be disaggregated; and (3) specification by field should be based on expert judgment about future needs, while the Committee's survey assesses only the current market situation.

As discussed earlier, some fields have better than average employment and utilization characteristics. It is not possible to choose a single list, because different criteria give somewhat different results. In the absence of definitive criteria for specifying postdoctoral priority fields, no conclusions should be drawn at this time. The Committee plans further analysis to determine whether priorities for postdoctoral research training should be specified in the future.

Recommendation. The Committee finds a continuing need for trained research scientists in all fields of the basic biomedical sciences.

At the predoctoral level, identification of specific basic biomedical science for research training should be eliminated from the NIH announcement, with training grants awarded on the basis of merit. Biomathematics/biostatistics and epidemiology are exceptions, and support for these two fields should continue at no less than the present level. In the event the NIH concludes it is desirable to indicate in its announcement special fields of interest for predoctoral training, the Committee recommends that the agency, within the limits of the biomedical sciences or behavioral sciences, state explicitly in the announcement that no specific field or subject matter is excluded from consideration (see "Announcement Fields" in Chapter 9).

At the postdoctoral level, there is no basis for denying support in any field since field-switching is very high and the employment evidence is not sufficiently conclusive at this time to be the basis for science policy decisions. The Committee recommends that the agencies make postdoctoral awards on the basis of merit within their broad statutory missions.

* * *

Related to the preceeding discussion on priority training in the basic biomedical sciences are three issues that arose from the public meeting. The first issue concerned the impact of new health and safety legislation upon manpower needs in the basic biomedical sciences. One recent example of this is the anticipated future need for toxicologists resulting from enactment of the Toxic Substances Control Act and other federal statutes regulating the safety of consumer products. It was suggested that the requirement of a "manpower impact statement" for each piece of new legislation would allow better manpower planning. The Committee recognizes that manpower needs are directly affected by such developments as legislation, but does not wish to recommend that a "manpower impact statement" be made mandatory to accompany all new legislation. In its deliberation on manpower needs, the Committee has considered all aspects of the problem that were addressed at the public meeting, including that of the impact of new legislation. The Committee does agree, however, that graduate students and academic departments should remain fully aware of legislative trends in determining the future specific needs of the country and anticipates that the fields of environmental health and toxicology will provide opportunities for biomedical scientists.

The second issue arose from the testimony presented to the Committee by the Chairman of the Second Task Force for Research Planning in Environmental Health Science. The report of the task force, which was later forwarded to the Committee for its consideration, included a section on research training in environmental health science, which emphasized the need for stability in the training programs; the role of postdoctoral awards; and personnel needs in the fields of environmental health science and toxicology, pathology, and epidemiology. The Committee also discussed these issues and will continue to examine the results of this and other studies that fall within its area of responsibility, but does recommend the report of this task force to the reader with a special interest in environmental health sciences.

The third issue concerned statements made about special needs for research training in certain fields of the basic biomedical sciences. Representatives of the following fields asked for special consideration in training level support: microbiology, pathology, pharmacology, toxicology, and the experimental biological sciences. As discussed previously, the Committee considered all fields carefully in the course of its deliberations. The Committee is of the opinion that no shortages occur at present and that the available data do not document the claims of special needs for the fields in whose behalf statements were made. The Committee again requests the submission of data to support anecdotal statements of shortages in these and other fields, on the basis of which future recommendations for special emphasis can be made.

FOOTNOTES

1. As explained in Appendix C, responses from 1,636 individuals who indicated either that they were employed in foreign countries or that they received doctoral training in fields other than the basic biomedical specialties specified in the survey taxonomy have not been included in the findings reported.

2. The only persons found to have a significantly low rate of response to the survey were foreign scientists, many of whom were believed to have returned to their own countries. (See Appendix C.)

3. Based on data from the NRC, Survey of Doctorate Recipients (NRC, 1973, 1975d).

4. It should be noted that the finer the subdivisions of fields within a broad area, the more likely it is that evidence of field-switching will be observed.

5. This fraction was somewhat lower for public health graduates, many of whom have taken administrative positions in government for which doctoral training was apparently useful but not required.

6. Comparable data for other basic biomedical fields may be found in Appendixes B1, B9, B15, and B17.

7. In this report, Ph.D. production figures exclude degree recipients who indicated a commitment for employment in a foreign country after graduation since few were expected to return to enter the U.S. labor force. Approximately 10 percent of the graduates in recent years left this country.

8. In his study, Freeman (1977) found this measure to be negatively correlated with demand indicators such as R and D expenditures and positively correlated with supply indicators.

9. Throughout this report, persons holding postdoctoral appointments were not considered to be part of the current labor force.

10. This relationship is as follows: $F/S = 0.02199 + 9.726 \times 10^{-3}(LSRD_{-2})$, where F = bioscience Ph.D.'s employed in academic institutions, S = estimated graduate and undergraduate enrollment in bioscience and health professions including medical and dental schools, and $LSRD_{-2}$ = life science R and D expenditures in colleges and universities, lagged two years (billions of 1967 $). Because of differences in taxonomy these variables are not exactly comparable in terms of areas covered. However, they

are approximations to the ideal quantities and are probably quite closely correlated with them.

11. The replacement of non-Ph.D. faculty with Ph.D.'s (enrichment) is not explicitly included in this analysis but is discussed later in the chapter.

12. Comparison between data developed in the Committee's surveys and those reported by the NSF are complicated by differences in taxonomy. The NSF usually reports data in the Life Sciences, including agriculture, biological, and medical sciences. The Committee's data were collected on a survey that used somewhat different definitions.

13. The NSF defines enrichment as an increase in the share of total employment represented by doctorates. Thus, the doctorate share of total employment in two-year colleges is projected to increase by 6.6 percent per year under the static model and by 9.9 percent per year under the probable model. See NSF (1975c, p.6).

4. BEHAVIORAL SCIENCES

With the inception of a modest program of individual fellowship support in 1948, the National Institute of Mental Health (NIMH) began the task of strengthening the behavioral science research effort in the United States through a program of awards designed to train individuals in the methods of the behavioral sciences (Schneider, 1974). While the fellowship was the preferred mechanism for research training in the early years of the institute's training effort, the institutional training grant, introduced in 1957, soon surpassed the fellowship program in the total number of awards made. Even today, as Table 1.1 illustrates, the traineeship dominates the behavioral science research training effort in ADAMHA at a ratio of about five traineeships to one fellowship.

While many individuals consider behavioral sciences research training to relate exclusively to the programs of ADAMHA, a recent study reports that over the years more than 3,000 awards have been made for research training in the behavioral sciences through the various Institutes of the NIH (NRC, 1976b). Most of this research training support has been provided through the programs of the National Institute of Child Health and Human Development (NICHD) and the National Institute of General Medical Sciences (NIGMS). However, a notable number of awards have also been made by such Institutes as the National Heart, Lung and Blood Institute (NHLBI), and the National Institute for Dental Research (NIDR).

Federal support for research training in the behavioral sciences has therefore expanded beyond the traditional research problems of mental health to embrace a broad range of physical as well as mental health questions as advances in our understanding of behavior have made contributions to these research efforts.

In its 1976 report, the Committee concluded that current market trends in the behavioral sciences suggested an "orderly tapering down of predoctoral support" at this time. Market information suggested that the age distribution of the Ph.D. behavioral scientists is rather young, with relatively few individuals retiring from the labor force in the next several years. Coupled with data that suggest the stabilization of undergraduate and graduate enrollments at this time, traditional modes of employment for the behavioral scientist emerging with doctoral training at this time are not forthcoming.

In an attempt to confirm the employment experiences of emerging behavioral scientists, the Committee sought information through a survey of recent graduates. In the following sections the results of this survey, together with data describing anticipated employment conditions, are provided.

CURRENT MARKET SITUATION FOR RECENT GRADUATES

As noted in the Committee's 1976 report (Chapter 3), the available forecasts[1] of the employment market for psychologists and other behavioral scientists projected a substantial oversupply of doctoral personnel by 1980. During the past year the Committee has examined findings from a survey of 1971-75 graduates to determine the current market situation in these fields. Responses were received from 4,538 (70 percent) of the 6,495 behavioral graduates surveyed,[2] and no important bias in response was found (Appendix C). In its analyses of survey data the Committee specifically examined: (1) percentage with full employment; (2) types of positions held; (3) mobility among training and employment fields; and (4) overall utilization of research training. Particular attention has been given to differences among graduates in five major fields within the behavioral sciences--anthropology, clinical psychology, (nonclinical) psychology, sociology, and other behavioral fields. Since federal research training money has been directed to only a subset of behavioral scientists in fields relevant to health research, separate consideration has been given to those doctorate recipients who had received predoctoral support from NIH, ADAMHA, or HRA.

Findings from the survey indicated that most of the behavioral science Ph.D.'s have been employed in full-time positions. Data summarized in Table 4.1 reveals:

- At the time of the survey more than 88 percent of these graduates held full-time positions and 3 percent held postdoctoral appointments; slightly more than 2 percent were seeking employment.

- An average of more than 83 percent of the 1971-75 Ph.D. recipients' total time (in months) since graduation was spent in regular full-time positions, and another 6 percent on postdoctoral appointments; only 2 percent of their

TABLE 4.1 Employment Status of 1971-75 Behavioral Ph.D. Recipients[a]

				Fiscal Year of Doctorate				
		Total	Trainees/ Fellows[b]	1971	1972	1973	1974	1975
Employment status (as of October 1976)								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Postdoctoral appointment	%	2.9	(4.1)	1.4	0.9	1.6	3.2	6.3
Full-time employment	%	88.2	(86.5)	87.6	92.0	89.7	87.6	85.0
Part-time employment	%	5.4	(6.5)	7.8	4.6	5.2	5.9	3.9
Seeking employment	%	2.4	(1.9)	1.9	1.4	2.8	2.3	3.4
Other status[c]	%	1.1	(1.0)	1.3	1.2	0.8	1.1	1.4
Survey item responses	N	3892	(1404)	606	608	679	762	1237
Estimated total Ph.D.'s	N	15926	(4698)	2817	2920	3059	3523	3607
Average time since receipt of doctorate spent in:								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Postdoctoral appointment	%	6.5	(8.1)	6.2	5.0	5.8	6.1	9.0
Full-time employment	%	83.5	(81.7)	83.7	88.1	85.0	82.2	79.4
Part-time employment	%	5.9	(6.7)	6.7	3.0	5.7	8.1	5.4
Seeking employment	%	2.0	(1.7)	1.1	1.9	1.7	1.6	3.4
Other status[c]	%	2.1	(1.9)	2.2	2.0	1.8	1.9	2.8
Survey item responses	N	3844	(1369)	593	600	674	752	1225
Estimated total Ph.D.'s	N	15926	(4698)	2817	2920	3059	3523	3607

[a] See Appendixes E1.1 and E2.1 for comparable data in each of the behavioral fields specified in the survey taxonomy.

[b] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA. See Appendixes E1.2 and E2.2 for comparable data in each of the behavioral fields specified in the survey taxonomy.

[c] Includes students and others who were unemployed and not seeking employment.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

time was spent unemployed and seeking a job.

- Similar results were found for the subpopulation of behavioral science Ph.D. recipients who had received predoctoral support from NIH/ADAMHA/HRA.

Although a higher rate of unemployment was observed for 1975 graduates than for 1971-74 degree recipients, the difference was quite small and does not clearly signify any change in labor market conditions. Recent behavioral science Ph.D.'s might be expected to encounter more difficulty in finding suitable positions in the initial stages of their careers than their biomedical counterparts, as there has been little support available for postdoctoral study in the behavioral sciences.

As shown in Tables 4.2a and 4.2b, a majority of the 1971-75 graduates in anthropology, psychology (excluding clinical), and sociology were employed in four-year colleges and universities and devoted most of their time to teaching and research activities. On the other hand, about two-thirds of the clinical psychologists held positions outside the academic sector and were much more likely to provide professional services, as might be expected. Although behavioral science graduates on the average spent less time in research than their biomedical science counterparts, more than 90 percent of the anthropologists and sociologists and more than 80 percent of the nonclinical psychologists indicated that they devoted at least some time to research activities. About one-third of these investigators received federal support, and many (between 25 and 37 percent) considered their research interest to be directly related to health (Table 4.3). The subpopulation of predoctoral trainees and fellows have had an even greater involvement in health-related research. This group was concentrated more heavily in the academic sector, devoted greater time to research activites directly related to health, and was more likely to receive federal research support.

In contrast to biomedical scientists, only a small fraction (about 10 percent) of the total behavioral research effort of 1971-75 graduates in the academic sector was carried out by persons holding postdoctoral appointments (Table 4.4). This is not surprising and is consistent with the fact that an average of only 12 percent of these graduates in all behavioral fields have pursued postdoctoral study within a year after graduation. The percentage is somewhat higher for those who had received predoctoral support from NIH/ADAMHA/HRA training programs. While this percentage did not increase during the 1971-75 period,[3] the overall number of behavioral Ph.D. recipients actually on postdoctoral appointments grew from an estimated 466

TABLE 4.3a Employment Sector of 1971-75 Behavioral Ph.D. Recipients[a]

		Field of Doctorate											
		Total Behavioral		Anthropology		Clinical Psych.		Psychology		Sociology		Other	
		Total	Trainees[b]	Total	Trainees	Total	Trainees	Total	Trainees	Total	Trainees	Total	Trainees
Type of employer or postdoctoral affiliation													
TOTAL	%	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)
Educational institution	%	64.4	(67.0)	88.[illegible]	(88.1)	33.0	(40.0)	72.7	(79.9)	79.5	(78.6)	75.8	(83.5)
University/college	%	49.1	(49.8)	76.9	(74.9)	17.4	(21.9)	55.2	(61.5)	69.9	(65.7)	60.6	(66.0)
Medical school	%	7.4	(10.9)	4.2	(6.9)	10.7	(14.8)	7.1	(9.8)	3.5	(6.3)	8.1	(11.7)
Other health professional school	%	1.8	(2.6)	1.7	(2.1)	0.6	(0.8)	2.0	(3.2)	3.3	(5.5)	1.9	(3.7)
Other educational institution	%	6.1	(3.7)	5.3	(4.2)	4.3	(2.5)	8.4	(5.4)	2.9	(1.1)	5.1	(2.1)
Government	%	12.5	(13.4)	4.8	(2.6)	21.8	(25.6)	10.6	(7.0)	6.9	(10.7)	9.2	(7.4)
Federal government	%	6.4	(6.6)	2.4	(1.6)	9.5	(10.7)	5.8	(4.0)	4.2	(7.7)	7.5	(5.3)
State or local government	%	6.2	(6.9)	2.4	(1.1)	12.4	(14.9)	4.8	(3.0)	2.8	(2.9)	1.7	(2.1)
Business/industry	%	9.5	(6.1)	2.5	(4.5)	17.2	(9.1)	7.6	(4.9)	6.3	(4.4)	6.5	(1.1)
Pharmaceutical firm	%	6.9	(4.9)	1.8	(4.0)	16.5	(8.4)	3.6	(3.2)	3.0	(2.8)	4.5	
Other business or industry	%	2.6	(1.2)	0.7	(0.5)	0.7	(0.7)	4.0	(1.6)	3.3	(1.7)	2.0	(1.1)
Other organizations	%	13.5	(13.5)	4.6	(4.8)	27.9	(25.3)	9.1	(8.3)	7.3	(6.3)	8.5	(8.0)
Hospital or clinic	%	7.3	(7.6)	1.4	(2.1)	18.7	(16.1)	3.8	(3.6)	1.3	(1.7)	4.8	(5.3)
Other types (including nonprofit)	%	6.2	(5.9)	3.2	(2.6)	9.3	(9.1)	5.3	(4.7)	6.0	(4.6)	3.7	(2.7)
Survey item responses	N	3716	(1352)	326	(131)	624	(237)	2097	(761)	355	(143)	314	(80)
Estimated total employed	N	15362	(4565)	1255	(305)	4119	(1548)	6957	(1901)	2094	(543)	937	(188)

[a] See Appendix E3.1 for comparable data in each of the behavioral fields specified in the survey taxonomy.

[b] Trainees include behavioral science Ph.D. recipients who have received predoctoral training support from NIH, ADAMHA, or HRA. See Appendix E3.2 for comparable data in each of the behavioral fields specified in the survey taxonomy.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

TABLE 4.2b Work Activities of 1971-75 Behavioral Ph.D. Recipients[a]

		Field of Doctorate											
		Total Behavioral		Anthropology		Clinical Psych.		Psychology		Sociology		Other	
		Total	Trainees[b]	Total	Trainees	Total	Trainees	Total	Trainees	Total	Trainees	Total	Trainees
Average time spent in:													
TOTAL	%	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)
Research and development	%	24.3	(28.5)	31.2	(32.6)	10.2	(13.0)	29.5	(38.2)	30.7	(36.4)	23.9	(26.5)
Teaching	%	32.0	(31.0)	48.9	(47.4)	15.5	(17.4)	34.6	(36.1)	43.2	(39.0)	38.7	(36.3)
Management and administration	%	14.8	(13.3)	12.4	(12.4)	16.1	(15.3)	14.4	(11.1)	14.3	(13.8)	16.4	(18.7)
Consulting	%	8.5	(7.1)	3.0	(3.4)	12.7	(11.2)	8.0	(4.9)	6.4	(4.9)	5.3	(8.7)
Other professional services	%	18.1	(18.0)	2.5	(2.6)	43.0	(40.0)	10.9	(7.9)	4.3	(4.1)	13.6	(8.7)
Other activities	%	2.3	(2.2)	2.0	(1.6)	2.4	(3.0)	2.6	(1.7)	1.2	(1.9)	2.1	(1.2)
Percent of employed Ph.D.'s in some research	%	78.1	(81.6)	93.5	(94.8)	59.1	(64.3)	81.4	(89.3)	92.8	(94.1)	84.2	(86.6)
Survey item responses	N	3666	(1334)	321	(127)	611	(236)	2074	(751)	351	(141)	309	(79)
Estimated total Ph.D.'s	N	15362	(4465)	1255	(385)	4119	(1548)	6957	(1901)	2094	(543)	937	(188)

[a] See Appendix E4.1 for comparable data in each of the behavioral fields specified in the survey taxonomy.

[b] Trainees include behavioral science Ph.D. recipients who have received predoctoral training support from NIH, ADAMHA, or HRA. See Appendix E4.2 for comparable data in each of the behavioral fields specified in the survey taxonomy.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

TABLE 4.3 Health-relatedness and Source of Support for Research Conducted by 1971-75 Behavioral Ph.D.'s[a]

		Total	Trainees/ Fellows[b]	Fiscal Year of Doctorate 1971	1972	1973	1974	1975
Research related to health								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Directly	%	42.3	(50.3)	45.8	37.5	45.4	42.2	40.8
Indirectly	%	40.6	(40.0)	38.2	44.9	40.3	39.0	40.8
Not at all	%	17.1	(9.7)	15.9	17.5	14.3	18.8	18.5
Research support from:								
TOTAL	%	100.0	(100.0)	100.0	100.0	100.0	100.0	100.0
Nonfederal sources	%	64.1	(59.5)	65.1	65.6	58.9	66.6	64.2
Federal sources[c]	%	35.9	(40.5)	34.9	34.4	41.1	33.4	35.8
NIH	%	10.8	(15.6)	11.1	9.8	12.2	10.0	11.1
ADAMHA	%	8.0	(12.0)	8.0	7.9	10.1	6.7	7.8
HRA	%	1.4	(1.9)	2.1	0.8	1.5	1.4	1.3
Other federal sources	%	20.2	(16.9)	18.2	21.1	23.2	19.7	19.1
Survey item responses	N	2967	(1142)	479	455	513	580	940
Estimated total researchers	N	11725	(3646)	2166	2109	2204	2564	2682

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[a] See Appendix E5.1 for comparable data in each of the behavioral fields specified in the survey taxonomy.

[b] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA. See Appendix E5.2 for comparable data in each of the behavioral fields specified in the survey taxonomy.

[c] Individuals with support from more than one agency are counted only once in the aggregated total for all federal sources.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

TABLE 4.4 Research Contribution of 1971-75 Behavioral Ph.D.'s Holding Postdoctoral Appointments[a]

				Fiscal Year of Doctorate				
		Total	Trainees/Fellows[b]	1971	1972	1973	1974	1975
Percent taking postdoc within a year after earning doctorate	%	12.0	(15.6)	13.0	12.4	12.4	9.9	12.4
Survey item responses	N	3892	(1404)	606	608	679	762	1237
Estimated total Ph.D.'s	N	15926	(4698)	2817	2920	3059	3523	3607
Fraction of total research time in academia contributed by postdocs[c]		0.107	(0.128)	0.041	0.01[illegible]	0.069	0.126	0.239
Survey item responses	N	2419	(954)	407	409	404	451	748
Estimated total employed in academic sectors	N	9417	(2970)	1810	1865	1635	1993	2114

[a] See Appendixes E10.1 and E12.1 for comparable data in each of the behavioral fields specified in the survey taxonomy.

[b] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA. See Appendixes E10.2 and E12.2 for comparable data in each of the behavioral fields specified in the survey taxonomy.

[c] Computed as follows: $(X_p \cdot Y_p) / (X_t \cdot Y_t)$

where X_p = total graduates on postdoctoral appointments

Y_p = average percentage of time these postdocs devote to research

X_t = total graduates employed (including postdocs)

Y_t = average percentage of time all employed graduates devote to research

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

individuals in 1972 to 750 in 1975.[4] Nevertheless, the 750 postdoctoral appointees in 1975 represented a negligible portion of the total available supply of doctoral scientists in behavioral fields. Federal training grants and fellowships have been a primary source of support for 70 percent of these appointments (Appendix E11) and undoubtedly have had an important impact on the rate of growth of postdoctorals.

Survey results reported in Table 4.5 indicated that there has been considerable mobility[5] between behavioral training and employment fields:

- More than 32 percent of all 1971-75 behavioral graduates were working in fields outside their doctoral specialties.

- Three-fourth of the graduates felt that their Ph.D. fields were closely related to their employment fields.

The Committee noted some important differences in the field-switching patterns of graduates trained in each of the four major behavioral fields:

- More than 90 percent of the clinical psychologists considered their doctoral training and employment fields to be closely related.

- In contrast, only 66 percent of the sociologists, 68 percent of the psychologists, and 79 percent of the anthropologists felt that their Ph.D. specialties were closely related to their employment fields.

Most of the field-switching has been to other specialties within the behavioral sciences. Only 8 percent of the 1971-75 graduates were employed outside the behavioral area, and less than 3 percent considered their training and employment fields to be unrelated.

Despite the substantial mobility that has occurred among behavioral fields, most of the recent graduates were currently employed in positions appropriate to their training. Survey results summarized in Table 4.6 specifically indicated:

- Of those employed in full-time positions (excluding postdoctoral appointments), more than 83 percent considered their doctorates essential in attaining their present positions,

TABLE 4.5 Relevance of Current Employment Field to Doctorate Field of 1971-75 Ph.D.'s[a]

		Field of Doctorate					
		Total	Anthro.	Clinical Psych.	Psych.	Sociology	Other
Employed in:							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Ph.D. Specialty	%	67.5	80.4	89.5	53.5	60.2	76.5
Other behavioral field	%	24.6	12.7	7.9	36.3	31.9	9.1
Other field	%	7.9	6.9	2.7	10.3	7.8	14.4
Ph.D. field and employment field were considered:							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Closely related	%	75.8	80.5	90.2	68.7	65.8	82.0
Somewhat related	%	21.7	21.7	9.7	27.9	31.1	13.4
Not at all related	%	2.5	2.6	0.1	3.4	3.2	4.6
Survey item responses	N	3638	321	600	2059	349	309
Estimated total employed	N	15362	1255	4119	6957	2094	937

[a] See Appendix E14.1 for comparable data in each of the behavioral fields specified in the survey taxonomy.

SOURCE: NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

TABLE 4.6 Relevance of Doctoral Degree, Training, and Research Experience to Present Employment Situation of 1971-75 Behavioral Ph.D.'s[a]

		Field of Doctorate					
		Total	Anthro.	Clinical Psych.	Psych.	Sociology	Other
In attaining present position, doctorate was considered:							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Essential	%	83.2	86.0	89.0	79.9	81.1	84.3
Helpful	%	13.5	10.7	9.9	15.6	15.9	12.0
Unimportant	%	2.8	2.2	1.1	4.1	2.2	3.1
Uncertain	%	0.5	1.1	0.0	0.4	0.9	0.7
Survey item responses	N	3367	299	567	1867	341	293
Estimated total full-time employed	N	14048	1153	3694	6323	2005	873
Necessary training required to fulfill present job							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Postdoctoral	%	4.9	2.1	7.1	5.9	1.2	0.7
M.D./Ph.D.	%	77.7	85.5	81.1	73.1	79.5	82.1
M.S./M.A.	%	14.7	9.1	10.8	17.5	16.3	15.0
B.S./B.A.	%	1.5	2.0	0.3	2.0	1.6	1.6
Other training	%	1.2	1.3	0.8	1.5	1.5	0.6
Survey item responses	N	3349	296	565	1854	340	294
Estimated total full-time employed	N	14048	1153	3694	6323	2005	873
Predoctoral research experience considered:							
TOTAL	%	100.0	100.0	100.0	100.0	100.0	100.0
Essential	%	47.8	73.4	25.2	53.9	54.1	50.4
Helpful	%	43.7	21.2	58.8	39.1	42.7	46.1
Not needed	%	6.9	3.4	14.5	5.2	2.3	2.2
Uncertain	%	1.6	1.9	1.5	1.8	1.0	1.3
Survey item responses	N	3320	297	554	1846	336	287
Estimated total full-time employed	N	14048	1153	3694	6323	2005	873

[a] See Appendixes E6.1, E7.1, and E8.1 for comparable data in each of the behavioral fields specified in the survey taxonomy.

SOURCE: NRC, Survey of Earned Doctorates, Washington, D.C., 1969-76.

while only 3 percent indicated that their degrees were unimportant.

- Almost 83 percent of these respondents felt that their doctoral or postdoctoral training was required to fulfill present job responsibilities adequately.

- Approximately 48 percent considered their predoctoral research experience essential to their present positions, while only 7 percent found this experience not at all useful.

Some important differences were found in the evaluation of predoctoral research experience by graduates in the four major behavioral disciplines. Only one-fourth of the clinical psychologists and slightly more than half of the sociologists and psychologists considered this predoctoral research experience essential to their present employment. In contrast, nearly three-fourths of the recent graduates in anthropology felt this training was essential to their work.

RECENT EXPANSION OF THE BEHAVIORAL SCIENCE LABOR FORCE

Although there is not yet evidence of a serious oversupply of behavioral scientists, the Committee nonetheless is concerned about factors that suggest that the labor force will expand at a faster rate than the job market in the near future. The past expansion of the labor force has been almost entirely due to the large increase in the total number of Ph.D.'s awarded annually in behavioral fields. The number of persons who received doctorates each year in these fields[6] has more than quadrupled between 1960 and 1976 (Figure 4.1 and Appendix E19). As more doctorates have been awarded each year, the proportion of degree recipients unable to find employment before graduation also has grown. By 1976 more than 18 percent of the graduating cohort had no prospective job commitment (Table 4.7).

Although this statistic[7] has increased in all behavioral fields, some important differences were noted. For example, less than 12 percent of 1976 Ph.D. recipients in sociology were without employment at graduation, but more than 26 percent of the anthropology graduates that year were in a similar situation. As mentioned in the preceding section of this chapter, nearly all of the recent behavioral science graduates have found positions soon after receiving their degree. However, a small but steadily increasing fraction planned to take jobs outside the academic sector (Table

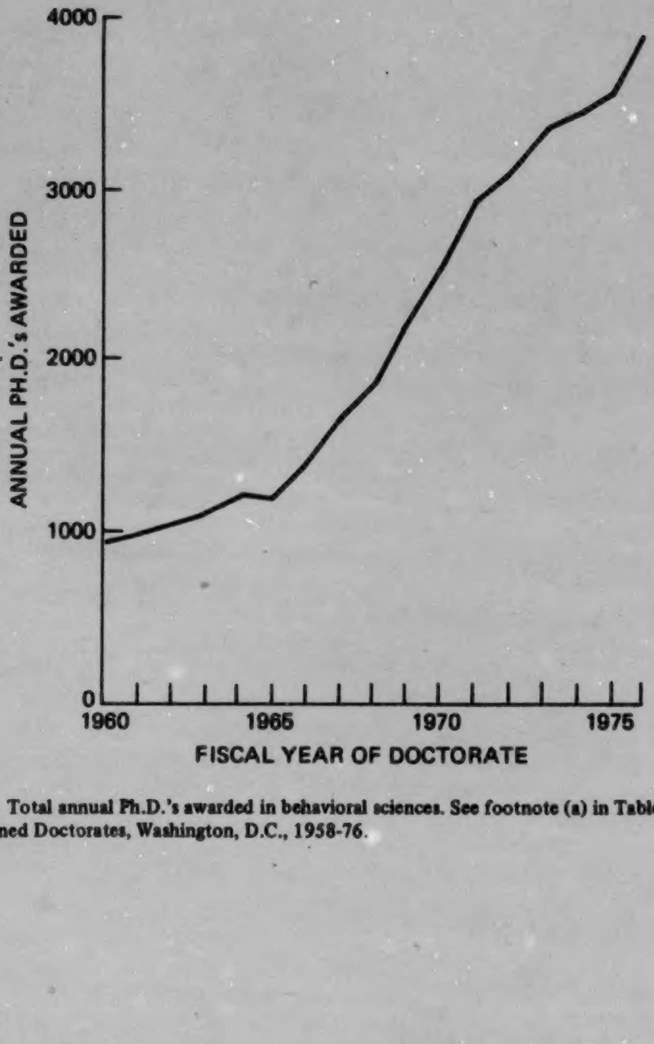


FIGURE 4.1 Total annual Ph.D.'s awarded in behavioral sciences. See footnote (a) in Table 4.7. Data from NRC, Survey of Earned Doctorates, Washington, D.C., 1958-76.

TABLE 4.7 Employment Prospects of 1969-76 Behavioral Ph.D.'s

		Fiscal Year of Doctorate							
		1969	1970	1971	1972	1973	1974	1975	1976
Job prospects at completion of Ph.D. program									
Total Ph.D.'s in behavioral sciences	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Firm commitment	%	81.5	81.3	81.6	78.7	77.0	75.1	73.6	71.2
Tentative plans	%	9.7	10.2	8.2	9.3	9.7	10.9	10.1	10.1
Seeking position	%	7.5	8.1	9.4	11.2	12.7	13.4	15.9	18.1
Other	%	1.3	0.3	0.8	0.7	0.5	0.7	0.3	0.6
Ph.D.'s in anthropology	N	159	194	217	231	299	346	354	386
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Firm commitment	%	89.0	88.3	86.5	87.0	78.3	76.3	63.2	65.7
Tentative plans	%	5.2	4.4	5.3	6.0	8.3	8.1	15.0	7.5
Seeking position	%	5.8	6.7	7.7	6.9	12.7	15.0	21.9	26.5
Other	%	0.0	0.6	0.5	0.0	0.7	0.6	0.0	0.3
Ph.D.'s in clinical psychology	N	514	533	601	667	731	760	790	863
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Firm commitment	%	78.1	74.0	72.9	74.5	75.9	72.8	71.3	68.8
Tentative plans	%	11.9	14.6	12.7	12.0	10.5	11.9	11.4	12.9
Seeking position	%	8.3	11.2	13.4	12.0	12.8	14.1	16.6	17.5
Other	%	1.6	0.2	1.0	1.5	0.7	1.2	0.7	0.8
Ph.D.'s in prychology	N	1168	1264	1424	1514	1660	1763	1847	1918
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Firm commitment	%	80.0	80.7	81.2	76.3	74.2	73.2	73.2	70.0
Tentative plans	%	10.3	10.5	8.1	9.4	9.9	11.4	10.0	9.9
Seeking position	%	8.3	8.4	9.5	14.0	15.3	14.8	16.6	19.4
Other	%	1.4	0.3	1.1	0.4	0.6	0.6	0.2	0.7
Ph.D.'s in sociology	N	353	449	527	576	527	581	596	663
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Firm commitment	%	88.4	86.0	87.7	85.3	83.9	82.4	82.0	79.7
Tentative plans	%	5.4	8.0	5.8	7.5	8.3	8.9	6.3	8.5
Seeking position	%	5.1	5.5	6.2	6.4	7.8	8.3	11.2	11.5
Other	%	1.2	0.5	0.2	0.9	0.0	0.4	0.5	0.3
Survey item responses[a]	N	2144	2459	2827	2937	3210	3275	3495	3781
Total Ph.D.'s[b]	N	2258	2556	2955	3115	3374	3576	3698	3971

[a] Only responses from graduates with definite or tentative employment plans were counted here.

[b] The total Ph.D.'s reported here exceeds the 1971-75 Ph.D. estimates presented earlier because the set of basic behavioral fields used from the Survey of Earned Doctorates, from which data in this table were derived, included a somewhat broader population than the set developed for the Committee's survey of recent doctorate recipients. A comparison of these two taxonomies is given in Chapter 2. See Appendix B21 for data on Ph.D.'s awarded in each biomedical field.

SOURCE: NRC, Survey of Earned Doctorates, Washington, D.C., 1969-76.

4.8). Most of this movement into nonacademic markets has been by psychologists (both clinicians and nonclinicians) who took positions in business (primarily self-employment), hospital/clinics, and other nonprofit organizations. Until the 2 percent increase in 1976 there had been no substantial change in the proportion of behavioral Ph.D. recipients who intended to undertake postdoctoral study.

Between 1972 and 1975 the behavioral science Ph.D. labor force expanded at an annual rate of more than 8 percent (Table 4.9). While all sectors shared in this growth, there was a slight decline in the proportion of behavioral scientists employed in the academic sector. Most behavioral research is performed in the academic sector, with government and industry playing lesser roles than they do in the biomedical area (see Table 3.11). Accordingly, it is not surprising to find that the fraction of the labor force doing some research[8] has declined between 1972 and 1975.

Nearly all of the expansion in the behavioral labor force has resulted from the direct entry of new graduates. As shown in Figure 4.2, the 1975 Ph.D. cohort represented a potential increment of nearly 11 percent to the existing labor force. Most of these graduates entered the labor force directly and did not pursue postdoctoral study. Although the total number of persons on postdoctoral appointments grew considerably between 1972 and 1975, this number represented a potential increment to the labor force of only 2 percent (i.e., should all 750 persons complete their postdoctoral appointments in 1975 and enter the labor force within the next year, the size of the behavioral labor force would increase by 2 percent). On the other hand, attrition from the behavioral labor force has been growing. Between 1972 and 1975 the number of behavioral science Ph.D.'s employed outside the area has increased, while fewer persons trained in other sciences were found in behavioral science employment fields (Table 4.10). The percentage of behavioral scientists retiring in 1975 was estimated to be as high as 1.8 percent[9] of the labor force. Nonetheless, the total number of persons leaving the labor force continues to be quite small in comparison to the number earning doctorates each year. Even if the number of Ph.D.'s awarded annually were not to increase any in the next few years, the Committee anticipates considerable expansion in the available supply of behavioral science Ph.D.'s.

OUTLOOK FOR THE BEHAVIORAL SCIENCES

From the survey results, it is apparent that for Ph.D.'s in the behavioral science fields the system works differently than for those in the biomedical science fields. More behavioral scientists tend to work in clinical research and treatment areas than do biomedical science Ph.D.'s, their

TABLE 4.8 Employment Plans of 1969-76 Behavioral Ph.D.'s

		Fiscal Year of Doctorate							
		1969	1970	1971	1972	1973	1974	1975	1976
Postgraduation plans									
Total Ph.D.'s in behavioral sciences	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Planning postdoc. appointment	%	11.0	11.3	11.1	10.8	11.0	11.3	11.8	13.5
Planning employment	%	88.5	88.2	88.3	88.7	88.3	88.5	87.4	85.5
Academic sector	%	59.4	60.5	61.6	58.5	54.9	53.8	52.6	48.7
Business	%	3.2	3.1	2.3	2.1	3.1	3.0	2.8	3.0
Government	%	13.8	13.4	12.8	16.2	14.8	15.2	15.2	15.3
Other	%	12.2	11.3	11.6	12.0	15.5	16.5	16.8	18.5
Other plans	%	0.5	0.4	0.6	0.5	0.7	0.2	0.9	1.0
Ph.D.'s in anthropology	N	159	194	217	231	299	346	354	386
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Planning postdoc. appointment	%	4.8	12.6	4.7	9.0	10.5	8.5	6.9	8.7
Planning employment	%	94.5	86.8	92.6	90.5	87.9	91.5	91.2	90.2
Academic sector	%	88.3	82.6	87.4	84.6	78.7	82.2	83.5	77.3
Business	%	0.0	0.0	0.0	0.5	1.3	2.2	1.9	0.4
Government	%	3.4	3.0	2.1	1.5	0.4	3.3	2.3	5.7
Other	%	2.8	1.2	3.2	4.0	7.5	3.7	3.4	7.2
Other plans	%	0.7	0.6	2.6	0.5	1.7	0.0	1.9	1.1
Ph.D.'s in clinical psychology	N	514	533	601	667	731	760	790	863
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Planning postdoc. appointment		13.2	9.1	10.4	9.8	10.1	11.7	11.5	12.5
Planning employment	%	86.8	90.7	89.2	89.9	89.3	87.9	88.1	86.9
Academic sector	%	32.9	36.3	34.7	26.4	28.3	25.1	24.8	22.6
Business	%	0.7	1.3	1.6	0.9	2.1	2.3	1.3	2.3
Government	%	32.2	34.6	32.7	39.4	33.3	28.9	31.9	32.5
Other	%	21.0	18.5	20.2	23.2	25.5	31.6	30.0	29.4
Other plans	%	0.0	0.2	0.4	0.4	0.7	0.3	0.5	0.6
Ph.D.'s in psychology	N	1168	1264	1424	1514	1660	1763	1847	1918
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Planning postdoc. appointment	%	13.3	15.4	16.4	14.9	14.0	14.7	15.9	18.5
Planning employment	%	86.4	84.1	83.2	84.6	85.1	85.1	83.2	80.5
Academic sector	%	59.3	56.9	57.2	56.1	51.6	49.8	48.3	43.0
Business	%	5.8	5.7	3.8	3.4	4.7	4.6	3.8	4.5
Government	%	9.6	9.6	10.7	13.9	12.7	15.1	13.7	13.7
Other	%	11.7	11.9	11.6	11.2	16.1	15.6	17.3	19.3
Other plans	%	0.3	0.5	0.3	0.5	0.8	0.1	1.0	1.0
Ph.D.'s in sociology	N	353	449	527	576	527	581	596	663
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Planning postdoc. appointment	%	3.2	4.2	2.6	3.5	5.2	3.9	3.7	5.0
Planning employment	%	95.2	95.4	96.6	95.7	94.6	95.6	95.9	93.7
Academic sector	%	84.4	85.8	86.0	87.6	84.1	83.6	84.1	81.1
Business	%	0.6	0.2	0.6	0.8	1.3	0.4	1.6	1.9
Government	%	5.1	3.7	3.9	3.3	4.5	5.8	5.1	4.5
Other	%	5.1	5.6	6.0	3.9	4.7	5.8	5.1	6.3
Other plans	%	1.6	0.5	0.9	0.8	0.2	0.4	0.4	1.3
Survey item responses[a]	N	1956	2251	2539	2585	2784	2814	2926	3071
Total Ph.D.'s[b]	N	2258	2556	2955	3115	3374	3576	3698	3971

[a] Only responses from graduates with definite or tentative employment plans were counted here.

[b] Includes a total (in all years) of 1,028 graduates in speech and hearing sciences not subsumed under one of the four major areas.

TABLE 4.9 Number of Persons in Sectors of the Behavioral Ph.D. Labor Force and Research Component,[a] 1972-75

	1972[b]		1973		1974		1975	
	N	%	N	%	N	%	N	%
Total Ph.D. labor force	28519	100.0	30805	100.0	33556	100.0	36508	100.0
Academic sector	18778	65.8	19718	64.0	21562	64.3	22746	62.3
Business	2569	9.0	2976	9.7	3541	10.6	4078	11.2
Government	2071	7.3	2072	6.7	2181	6.5	2457	6.7
Other sectors	4910	17.2	5683	18.4	6038	18.0	6863	18.8
Unemployed	191	0.7	356	1.2	234	0.7	364	1.0
Total research component	16044	100.0	17257	100.0	17098	100.0	18815	100.0
Academic sector	12428	77.5	13056	75.7	13389	78.3	14364	76.3
Business	792	4.9	894	5.2	804	4.7	1001	5.3
Government	1147	7.1	1153	6.7	1143	6.7	1333	7.1
Other sectors	1677	10.5	2154	12.5	1762	10.3	2117	11.3
Survey item responses	4328		4656		4764		5041	

[a] Labor force includes persons employed in positions other than postdoctoral appointments as well as unemployed persons who are seeking positions. The research component constitutes those in the labor force who considered research their primary or secondary work activity.

[b] Estimates for a particular year include individuals who had received doctorates prior to that fiscal year.

SOURCE: NRC, Survey of Doctorate Recipients, Washington, D.C., 1973 and 1975.

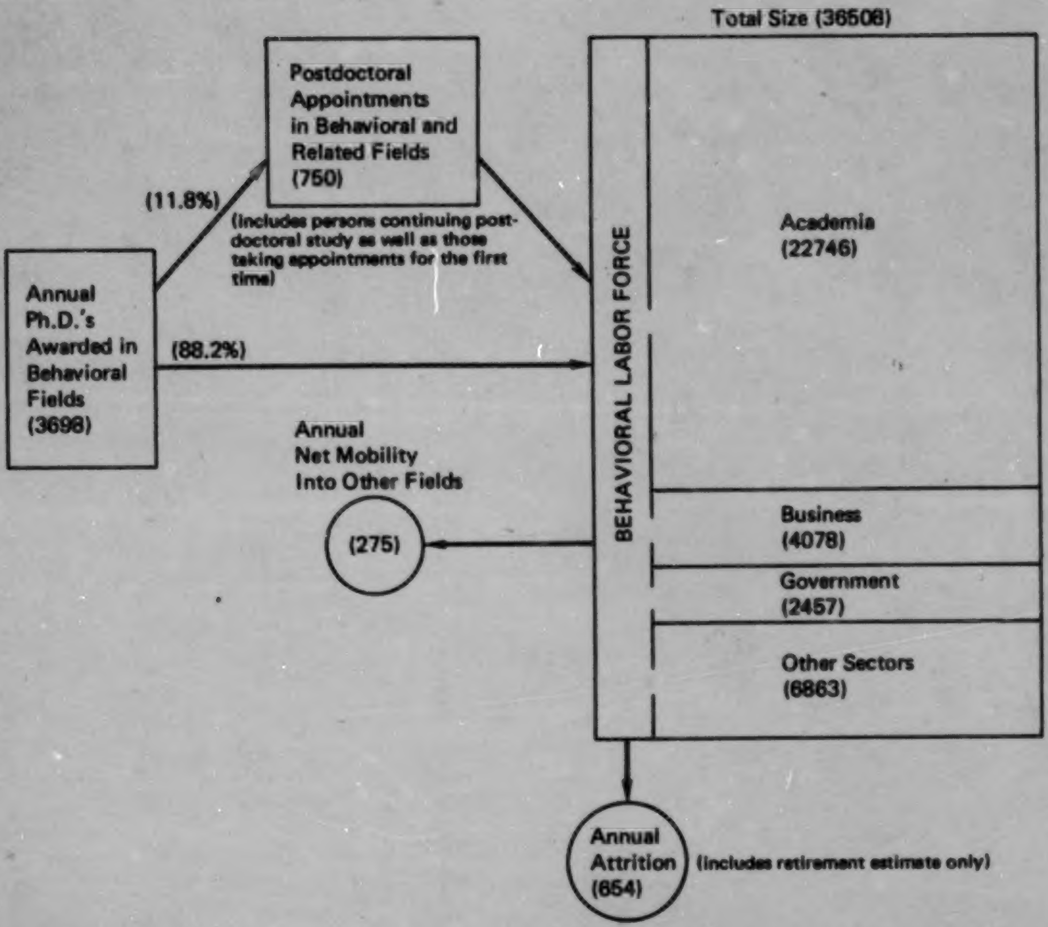

Total Size (36508)
Postdoctoral Appointments in Behavioral and Related Fields (750)
(11.8%)
(includes persons continuing post-doctoral study as well as those taking appointments for the first time)
Annual Ph.D.'s Awarded in Behavioral Fields (3698)
(88.2%)
BEHAVIORAL LABOR FORCE
Academia (22746)
Business (4078)
Government (2457)
Other Sectors (6863)
Annual Net Mobility Into Other Fields
(275)
Annual Attrition (654)
(includes retirement estimate only)

FIGURE 4.2 Components contributing to the annual growth of the behavioral science labor force. Figures in parentheses represent estimated sizes in 1975. From NRC, Survey of Doctorate Recipients, Washington, D.C., 1975.

TABLE 4.10 Field Mobility of Ph.D.'s into and out of Behavioral Sciences, 1972-75

	1972[a]		1973		1974		1975	
	N	%	N	%	N	%	N	%
Total active behavioral Ph.D.'s	26575	100.0	29092	100.0	33207	100.0	36434	100.0
Employed in behavioral area	23407	88.1	25385	87.3	29482	88.8	32197	88.4
Employed in other area	2977	11.2	3351	11.5	3491	10.5	3873	10.6
Unemployed	191	0.7	356	1.2	234	0.7	364	1.0
Total employed in behavioral area	28328	100.0	30448	100.0	33322	100.0	36144	100.0
Ph.D. in behavioral area	23407	82.6	25385	83.4	29482	88.5	32197	89.1
Ph.D. in other area	4921	17.4	5063	16.6	3840	11.5	3947	10.9
Survey item responses	3585		3941		4206		4515	

[a] Estimates for a particular year include individuals who had received doctorates prior to that fiscal year.

SOURCE: NRC, Survey of Doctorate Recipients, Washington, D.C., 1973 and 1975.

training and research are supported by the federal government to a far lesser extent, and postdoctoral appointments are markedly fewer.

These are important differences, but perhaps the most significant distinction between behavioral and biomedical scientists is in their work activities. Behavioral science Ph.D.'s spend less than half as much time in research and considerably more time in teaching and professional services (mainly clinical psychologists). Consequently the demand for Ph.D. scientists in the behavioral science fields is governed less by R and D expenditures and more by enrollments than in the biomedical science fields. The composition of the behavioral sciences has much to do with this. Sociology and anthropology are highly research-oriented fields, but they are small in comparison to psychology. On the other hand, a significant portion of psychologists are clinically oriented, thus weakening the association between research expenditures and faculty positions in the total behavioral sciences area.

In the biosciences (see Chapter 3) academic demand was shown to be dependent on R and D expenditures and enrollments, but because it is not possible to demonstrate any significant correlation between R and D expenditures and academic demand for behavioral scientists without disaggregating the behavioral science fields, enrollment trends become even more significant in these fields than in the biomedical sciences with regard to estimating future demand. First-year graduate enrollment in the behavioral sciences slowed to an annual growth rate of 2.5 percent in 1971 (Table 4.11) after a decade of rapid growth averaging more than 11 percent per year. But academic demand is probably affected by a broader measure of enrollment. Estimates of total undergraduate and graduate enrollment in the behavioral sciences have been developed in this study for the period 1961-75 (Figure 4.3). They show a similar pattern--rising at almost 14 percent per year throughout the 1960's to a peak in 1972, then resuming growth at a somewhat reduced rate (about 6 percent per year) in 1974.

In order to estimate the near-term outlook for behavioral science Ph.D.'s, we have made three projections of total behavioral science enrollment in colleges and universities. The high estimate (Assumption A) assumes that the current trend (6 percent per year) will continue, rising to 1.2 million in 1982. A middle estimate (Assumption B) is based on Cartter's (1976) projected rate of 2.08 percent per year for enrollment in all fields up to 1982. This assumption yields an estimated 912,750 graduate and undergraduate students in the behavioral sciences in 1982. The low estimate (Assumption C) assumes essentially no growth in enrollment, so that through 1982 it remains at the 1975 level of almost 800,000 (Figure 4.3).

Another factor affecting academic demand is the Ph.D. faculty/student ratio (F/S), where F = total Ph.D. faculty

TABLE 4.11 Current Trends in Supply/Demand Indicators for Behavioral Science[a] Ph.D.'s

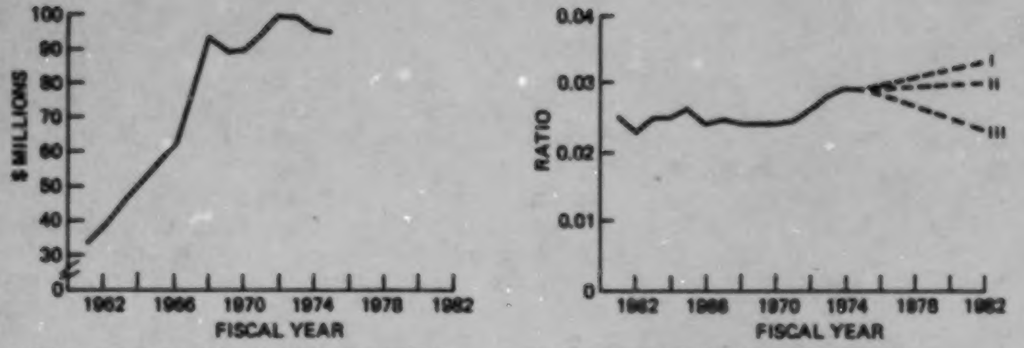
	1971	1975	Average Annual Growth Rate, 1971-75
Supply indicators:			
Ph.D. production	2,955	3,698	5.8%
Postdoctoral appts.	466 (1972)	750	17.2% (1972-75)
Demand indicators:			
Behavioral science R and D expenditures at colleges and universities (1967 $)	$94.6 million	$94.6 million	0%
DHEW[b] obligations for research in psychology and the social sciences (1967 $)	$150.7 million	$105.8 million	-8.5%
Labor force:			
Behavioral Ph.D.'s employed in colleges and universities (excluding postdoctorals)	18,778	22,746	4.9%
Behavioral science enrollments:			
First-year grad.	22,709	25,081	2.5%
Total grad.	40,356	49,036	5.0%
Estimated undergrad.	653,759	741,214	3.2%
Total grad. and undergrad.[c]	694,115	790,250	3.3%

[a] In this table the behavioral fields are defined as psychology, sociology, and anthropology.

[b] A large part of these research programs have been funded through the U.S. Office of Education, which had a sharp drop from $54 million in 1971 to $5 million in 1975.

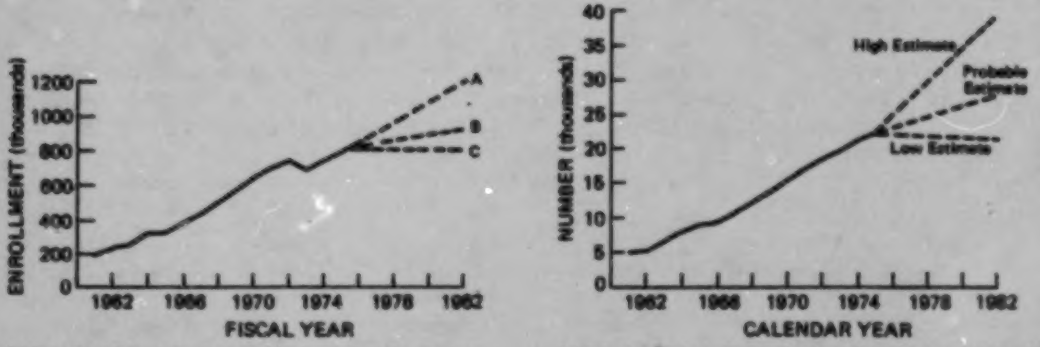
[c] Estimated by the formula $U_i = (A_{i+2}/B_{i+2})C_i$, where U_i = behavioral science undergraduate enrollments in year i; A_{i+2} = behavioral science baccalaureate degrees awarded in year i+2; B_{i+2} = total baccalaureate degrees awarded in year i+2; C_i = total undergraduate enrollments in year i.

SOURCES: NRC (1973, 1975d), NSF (1976), U.S. Office of Education (1975a, b).



(a) Behavioral R and D at Colleges and Universities (1967 $)

(b) Behavioral Science Ph.D. Faculty/Student Ratio



(c) Behavioral Science Graduate and Undergraduate Enrollment

(d) Behavioral Science Ph.D.'s Employed in Colleges and Universities

FIGURE 4.3 Behavioral science (psychology, sociology, and anthropology) enrollment, R and D expenditures, and academic employment, 1961-75, with projections to 1982. Based on data from NRC (1973, 1975d), NSF (1956-70, 1976), and U.S. Office of Education (1959-75). See also Appendix F1.

and S = graduate and undergraduate degree-credit enrollment. Over the 15 years from 1961 to 1975, this ratio ranged from a low of 0.023 in 1962 to a high of 0.029 in 1974 for behavioral science Ph.D.'s.[10] Within this range there has been considerable fluctuation over time, which is apparently not explained by R and D expenditures, contrary to the situation for the biomedical sciences. Three assumptions have been made about the future patterns of the faculty/student ratio for behavioral Ph.D.'s. The high assumption is that the F/S ratio will continue to increase, reaching 0.033 in 1982. The middle assumption is that the F/S ration will increase slightly to 0.030 by 1982. The low assumption is that the F/S ratio will decline to 0.028 by 1982.

Projections of the expected number of behavioral science Ph.D.'s to be employed by colleges and universities in 1982 under the nine assumptions (about future enrollments and future F/S ratios) are shown in Table 4.12.

Under the highest combination of assumptions (IA of Table 4.12), the Ph.D. component of the behavioral science faculty would grow by 8.2 percent per year to 39,600 in 1982. This rate is much higher than its current 4.9 percent annual rate of growth and appears quite unrealistic. Assumptions IIA and IIIA also lead to a projected growth rate higher than the current one. All other assumptions result in a lower-than-current rate. Thus, only with a fairly high F/S ratio and under the most optimistic projection of enrollment would academic employment opportunities for Ph.D.'s in the behavioral sciences expand faster than at present. If behavioral science enrollment approaches the growth rate projected by Cartter for all fields, a considerable slowdown from the current growth in behavioral science Ph.D. faculty can be expected over the 1975-82 period.

The projections of behavioral science Ph.D. faculty size shown in Table 4.12 are translated in Table 4.13 into annual increments expected due to faculty expansion. In addition to expansion needs, a certain number are needed for replacement. These are also calculated in Table 4.13 on the basis of Cartter's estimated death and retirement rate of 1.3 percent per year.

Historically, between 60 and 65 percent[11] of the behavioral science Ph.D. labor force have found academic employment (excluding postdoctorals). At the current level of behavioral science Ph.D. production (about 4,000 in 1976), between 2,400 and 2,600 new behavioral science Ph.D.'s would expect to find academic employment based on past experience. However, only under the highest assumptions would this number of academic positions become available. The Committee believes that this is unlikely to occur.

If Cartter's projected growth rate prevails, at best only about 1,400 positions would be available annually.

TABLE 4.12 Projected Growth in Behavioral Ph.D. Faculty, 1975-82, Based on Projections of Enrollment and Faculty/Student Ratio

		Assumptions about the Faculty/Student Ratio for Behavioral Ph.D.'s		
Assumptions about Behavioral Science Graduate and Undergraduate Enrollment		I Will continue to grow, reaching 0.033 by 1982	II Increases slightly to 0.03 by 1982	III Declines to 0.028 by 1982
A. Will continue to grow at present rate (about 6%/yr from 1973 to 1975), reaching 1,200,000 by 1982	Expected size of behavioral science faculty (F) in 1982	39,600	36,000	33,600
	Annual growth rate in F from 1975-82	8.2%	6.8%	5.7%
B. Will grow at the 2.08%/yr rate projected by Allan Cartter, reaching 912,750 by 1982	Expected size of behavioral science faculty (F) in 1982	30,120	27,382	25,557
	Annual growth rate in F from 1975-82	4.1%	2.7%	1.7%
C. Essentially no growth from 1975 to 1982; 1982 level = 800,000	Expected size of behavioral science faculty (F) in 1982	26,400	24,000	22,400
	Annual growth rate in F from 1975-82	2.2%	0.8%	-0.2%

TABLE 4.13 Projected Average Annual Increment in Behavioral Science Ph.D. Faculty Due to Expansion and Replacement

Assumptions about Behavioral Science Graduate and Undergraduate Enrollment		Assumptions about the Faculty/Student Ratio for Behavioral Ph.D.'s I Will continue to grow, reaching 0.033 by 1982	 II Increases slightly to 0.03 by 1982	 III Declines to 0.028 by 1982
A. Will continue to grow at present rate (about 6%/yr from 1973 to 1975), reaching 1,200,000 by 1982	Average annual increment due to faculty expansion	2,408	1,893	1,551
	Annual replacement needs due to death and retirement[a]	405	382	366
	Expected total annual increment in behavioral science Ph.D. faculty	2,813	2,275	,917
. Will grow at the 2.08%/yr projected by Allan Cartter, reaching 912,750 by 1982	Average annual increment due to faculty expansion	1,053	662	402
	Annual replacement needs due to death and retirement[a]	344	326	314
	Expected total annual increment in behavioral science Ph.D. faculty	1,397	988	716
. Essentially no growth from 1975 to 1982; 1982 level = 800,000	Average annual increment due to faculty expansion	522	179	-49
	Annual replacement needs due to death and retirement[a]	319	304	293
	Expected total anuual increment in behavioral science Ph.D. faculty	841	841	483

Based on an estimated replacement rate of 1.3% annually due to death and retirement. See Cartter, op. cit., p. 121.

Either behavioral science Ph.D. production would have to drop to about half its current level, or the fraction of each Ph.D. cohort that would find academic employment under these circumstances would be much smaller than it has been in the past, perhaps as small as 35 percent.

As in the biomedical sciences section, these comparisons are based on past employment patterns of Ph.D.'s on college faculties. Of course, not all faculty positions are held by individuals with doctorate degrees. The process by which Ph.D.'s acquire a larger share of the academic labor market has been characterized as enrichment by the NSF (1975c).

There is no indication that enrichment has been occurring in the behavioral science fields. For example, in 1971 there were 16,800 psychologists employed in colleges and universities, of which 10,600 (63 percent) were Ph.D.'s. In 1975, an identical proportion of psychologists employed by colleges and universities held Ph.D.'s (13,600 out of 21,700, or 63 percent; NSF, 1975a). However, there is a potential enrichment factor here of about 100 positions per year for Ph.D.'s in psychology if the 8,100 nondoctorates are replaced (at Cartter's estimated death and retirement rate of 1.3 percent annually) by psychology Ph.D.'s. Comparable data for the other behavioral fields of sociology and anthropology are not available.

In contrast to the biomedical sciences, there are signs of a movement away from academic employment in the behavioral fields. In 1975, the proportion of the behavioral science Ph.D. labor force employed in academia was 61.5 percent, down from 64.8 percent in 1972. Somewhat greater proportions are now found in private industry (11.0 percent up from 8.9 percent in 1972) and other sectors, including hospitals, clinics, and nonprofit organizations (18.5 percent up from 16.9 percent in 1972).

RECOMMENDATIONS

Because data suggest a general decline in college enrollments in the next decade, and little change in the faculty/student ratio (F/S), the Committee has concluded that the academic sector cannot continue to absorb new Ph.D.'s at the same rate as in the past given current rates of production and current employment conditions. Hence, the Committee recognizes the need to provide a reduced but effective program of predoctoral research training support, which would continue to train individuals in traditional fields important to the national mental health effort, in fields that depend on predoctoral funds for research experience in the natural setting (i.e., nonlaboratory field work), and in promising areas of behavioral investigation.

The Committee continues to view a shift to postdoctoral support as an appropriate means to promote the emergence of specialized investigators in the area of behavior and health. In making its recommendations for a continued shift to postdoctoral training, the Committee again stresses the importance of minimizing institutional dislocation as a result of this program change. It is the hope of the Committee that the gradual shift to postdoctoral training will result in a well-planned training effort sensitive to the impact of new postdoctoral training opportunities on the career patterns of behavioral scientists.

Postdoctoral training represents a departure from the typical career pattern for the behavioral scientist today, in contrast to the pattern for the biomedical research scientist. Only a small fraction of the total behavioral research effort is carried out by persons holding postdoctoral appointments at this time (Appendix E12.1). The Committee considers the NRSA's a means to propel talented Ph.D. investigators into the mainstream of productive employment in the area of behavioral and health as a result of intensive postdoctoral research training experience. Thus, while the Committee is aware that this shift to postdoctoral training will contribute to the expansion of the postdoctoral population, which is growing even today, the Committee considers such training essential to assure the availability of investigators in fields for which predoctoral training may not be adequate.

Reports developed by various study groups of the President's Biomedical Research Panel conclude, for example, that increased opportunities for postdoctoral research training would assist the behavioral scientist to address urgent research questions challenging researchers today. Postdoctoral research training has been acknowledged as an important means to strengthen or develop skills in such areas as population research, including demographic and fertility studies, in evaluation research and computer simulation methods, and in the role of behavior in disease development (Behavioral Sciences Interdisciplinary Cluster, 1976). Such training is also viewed as a means to extend the cooperative study of brain functions by neuro- and behavioral scientists with respect to such processes as learning, sensation and perception, sleep, aging, and emotion (Neurosciences Interdisciplinary Cluster, 1976). Finally, in the area of behavior development, postdoctoral research training may provide the skills necessary to elaborate more precise methods for diagnosing hyperkinesis, autism, and various forms of mental retardation and to provide techniques to better understand the interaction of individual, family, and society in adolescent development (Social and Behavioral Interdisciplinary Cluster, 1976).

From these examples it is clear that advances in research and changing patterns of education have far-reaching impact on the development of research training policies in the behavioral sciences. As a result the Committee views the continued monitoring of these and other developments as an important task as recommendations for research training are developed.

Manpower Employment Characteristics

The distribution by field of training of research personnel who contribute to federally funded research grants and contracts provides important data for the assessment of the current utilization of research skills. As described in Chapter 2, the NIH have collected data on such manpower employment characteristics. The Committee views these data as a potentially valuable source of information and notes that comparable data are not available at this time from ADAMHA. Such data are critical to a complete assessment of employment characteristics in the behavioral sciences and possibly for evaluation of future training needs.

Recommendation. The Committee urges ADAMHA to undertake the systematic collection of data on the characteristics of paid and nonpaid professional personnel employed on research grants and contracts, in order to permit a comprehensive assessment of the utilization of research training skills in the behavioral sciences.

Predoctoral/Postdoctoral Training

In view of a continuing need for additional specialized research training in health-related fields of behavioral science research, and a somewhat reduced need for federal support to produce research doctorates in the traditional fields of the behavioral sciences, the Committee concludes that the shift toward an increased emphasis on postdoctoral training recommended in its 1976 report should be continued at this time.

In specifying a shift to postdoctoral support in its 1976 report, the Committee developed numerical recommendations to reflect the gradual shift from predominantly predoctoral to predominantly postdoctoral training so important to a minimization of institutional disruption while reorienting the future of research training in the behavioral sciences. As Table 4.14 reveals, the proportion of awards to be made in the behavioral sciences in FY 1978 retain a majority (approximately 53 percent) at the predoctoral level. At the November 1976 public hearing, representatives from a variety of behavioral science and related fields stressed the importance of a smooth transition from predoctoral to postdoctoral support that

TABLE 4.14 Committee Recommendations for NIH and ADAMHA Predoctoral and Postdoctoral Traineeship and Fellowship Awards in the Behavioral Sciences

Agency Awards and Committee Recommendations	Fiscal Year						
	1975	1976	1977	1978	1979	1980	1981
Actual awards							
Total	*1966*	*1855*[a]					
Pre	*1754*	*1496*					
Post	*212*	*359*					
1976 recommendations							
Total		1860	1740	1590			
Pre		1500	1200	850			
Post		360	540	740			
1977 recommendations							
Total					1490	1390	1300
Pre					745	575	390
Post					745	815	910

[a] FY 1976 awards include those made during the transition quarter (the three-month period from July-September 1976, during which the government changed to a new fiscal year definition).

would not jeopardize the availability of support "which too often has been precipitcusly dropped, leaving institutions without time or resources for an appropriate redirection" (Appley, 1976). The Committee reiterates its position that a gradual rather than a rapid shift should be made toward greater postdoctoral training.

The Committee notes that the NRSA announcements released by ADAMHA in May 1977 for FY 1978 awards state that the highest priority for funding individual fellowships and institutional training grants will be given to applicants for postdoctoral training, and that "any request for support of predoctoral training" in institutional grants "must be accompanied by special justification in terms of manpower needs in the particular research area(s) to be encompassed by the proposed training program."

At the time of the preparation of this report, data were not available to determine whether the Committee's recommendations were being implemented at the rate proposed. The Committee believes, however, that it would be unfortunate if the wording of this announcement resulted in a more severe curtailment by ADAMHA in the number of predoctoral awards in the behavioral sciences than that recommended in the 1976 report.

Recommendation. The Committee recommends that the shift to a ratio of 30 percent predoctoral/70 percent postdoctoral awards be accomplished by FY 1981. As emphasized in its 1976 report, the Committee recommends that this shift come about gradually so that the distribution in FY 1979 should represent about 50 percent predoctoral/50 percent postdoctoral awards (shown in Table 4.14).

In view of the importance of support for fieldwork at the predoctoral level in certain disciplines, such as anthropology, the Committee recommends that an adequate number of predoctoral NRSA's be maintained for this purpose as the shift to predominantly postdoctoral training is achieved.

Traineeships/Fellowships

The training grant has become the primary mechanism of support for research training in the behavioral sciences over the years. In FY 1975 and 1976, for example, over 80 percent of the total number of awards in this area were made in the form of traineeships (see Table 1.1). As a result, in specifying its recommendations for program change, the Committee has been sensitive to the need to assure stability of program support for training institutions as the shift to predominantly postdoctoral training is achieved by FY 1981.

Hence, the Committee recommends that research traineeships remain the primary mechanism of support for training in behavioral research and that institutions seek to develop training proposals that appropriately mix predoctoral and postdoctoral support.

There is another reason to seek the maintenance of training support through the research training grant. In the view of the Committee it is through the research training grant that effective programs of training can be developed in innovative areas of research, such as research on the role of behavior as it results in physical illness or the maintenance of health. Training grants bring together a critical mass of investigators, often from a variety of disciplines, who can direct their research efforts mutually to questions of common concern. Further, training grants strengthen the research setting through a continuity of support that fellowships do not provide. In short, the research-training grant assures the development of innovative research through program stability, just as it assures the maintenance of programs in established research fields, such as child development, crime and delinquency, minority group needs, or culture and health.

In addition to research traineeships, the Committee recommends the maintenance of research training support through the individual fellowship. By providing for individual awards, the Committee believes that important flexibility is introduced into the system of behavioral science research and research training. It is through this mechanism of support that talented investigators with special research needs can seek appropriate training, which a training grant may not provide. For example, the individual fellowship may permit the predoctoral anthropologist or ethologist to gain important nonlaboratory research experience, or it may permit the individual to seek specialized training with a single individual whose work has advanced an important research area.

Recommendation. The Committee recommends that the current proportion of 82 percent traineeships/18 percent fellowships be maintained.

Priority Fields

In approaching the problem of priorities, the Committee reviewed recent developments in the behavioral sciences relevant to health problems. It appears that significant progress has been made in both traditional areas of research and in some of the newly emerging areas such as the role of behavior as it results in physical illness or the maintenance of health.

In an effort to foster an understanding of these emerging areas of research and to stimulate discussion concerning appropriate forms of research training in the face of these developments, the Committee invited a number of prominent researchers to address these topics at the 1977 annual meeting of the American Association for the Advancement of Science (AAAS). The symposium provoked a wide range of comments regarding training in techniques relevant to an understanding of the role of behavior in physical illness and health, and the application of this knowledge to the diagnosis, prevention, treatment, and rehabilitation of physical disorders. Mental dysfunctions that contribute to physical problems, such as severe weight loss associated with anorexia nervosa, are included in this category, as well as behavioral factors in drug abuse and alcoholism. The Committee suggests that investigators be trained in the behavioral sciences to address these critical research problems.

The term "behavior and health" is intended to strengthen but one aspect of the total behavioral research effort today. There is no doubt that the problems of mental health and human development remain fundamental research issues for behavioral scientists. The Committee views as a continuing priority the training of investigators in these traditional areas, which are characterized by continued advances in our understanding of individual and social behavior relevant to sound mental health.

Because of the difficulty of determining priorities in a rapidly changing area, the Committee has concluded once again that members of the scientific community, who take into account newly emerging needs and promising research developments while developing research training proposals, are in the best position to determine the appropriate mix of fields that will contribute to the training of skilled investigators in the area of behavior and health. The Committee has concluded, therefore, that it is not in a position at this time to impose arbitrary restrictions on the development of particular fields in the behavioral sciences by specifying fields for priority support.

The Committee recognizes the close similarity between training for research in the behavioral sciences and training in health services research, because the methods and personnel of the behavioral sciences contribute to the conduct of health services research as defined elsewhere (see Chapter 6). Nevertheless, the Committee views its recommendations in the behavioral sciences to exclude training for individuals whose primary research problem addresses the effectiveness of the health care system (including provider behavior) to meet the health needs of the individual or the population. This latter area is included in the numerical recommendations for health services research training.

FOOTNOTES

1. In both the Bureau of Labor Statistics (1975) and the NSF (1975c) reports, the 1980 supply of Ph.D. psychologists and social scientists was projected to be substantially larger than the demand for these personnel.

2. Responses from 577 persons who indicated that their doctorates were not in any of the behavioral fields included in the survey taxonomy or who were employed in foreign countries were not used in the tables that follow.

3. The low percentage for 1974 graduates apparently reflects the impact from the impoundment of federal training and research funds in the preceding year.

4. Estimated from data collected in the 1973 and 1975 Survey of Doctorate Recipients (NRC, 1973, 1975d).

5. Data were based on field-switching among the set of 24 behavioral science specialties given in Appendix E14.

6. Annual Ph.D. production figures include only degree recipients intending to enter the U.S. labor force. Approximately 10 percent of the recent graduates have returned to foreign countries.

7. As mentioned in Chapter 3, Freeman (1977) found this measure to be a reasonably reliable indicator of the current state of the labor market.

8. For the purposes of this analysis, the research component included all persons in the labor force who considered research to be their primary or secondary work activity.

9. The retirement figure estimated here considerably exceeds the 1.3 percent estimate made by Allan Cartter (1976).

10. The average value of F/S for behavioral Ph.D.'s from 1961-75 was 0.025; in the biomedical sciences it was 0.030. This is consistent with the finding of a correlation between F/S and R and D expenditures in the biomedical sciences but not in the behavioral fields. The higher F/S value is attributable to the greater participation in research by biomedical Ph.D.'s.

11. Based on data from the NRC, Survey of Doctorate Recipients (1973, 1975d).

5. CLINICAL SCIENCES

Modern clinical investigation is based on the concept that the development of effective measures to prevent or treat human illness requires a knowledge of the manifestations of a disease, as well as an understanding of its cause and mechanisms. That understanding, in turn, is derived from fundamental principles of biology. Future contributions to the solution of health problems may well be expected from the clinical scientist firmly grounded in both clinical medicine and modern biology. For purposes of this report, clinical investigation involves individuals with the M.D., D.D.S., D.V.M., and other health professional degrees, and individuals with the Ph.D. degree who work in this area.

The most productive clinical research is often performed by investigators whose observations at the bedside or in the clinical laboratory have furnished stimulus for their studies. Through their dual expertise, clinical scientists are uniquely equipped to investigate the applicability of new biomedical knowledge to disease problems in man. Equally important, although less frequently emphasized, is their capacity to develop new knowledge, which is subsequently exploited by the basic biomedical scientist. For example, most of the plasma components required for normal blood coagulation were discovered by clinical investigators who studied patients with hemorrhagic disorders. Vitamin B^{12} ultimately emerged from the observed action of liver extract in pernicious anemia. Many other examples, new and old, could be cited to document the bidirectional flow of information between clinical and basic biomedical scientists.

Upon receipt of the M.D. degree, physicians generally pursue several years of clinical training as resident physicians. Even the most outstanding education and training in clinical medicine does not prepare physicians for careers in research. Their grasp of human biology and disease mechanisms is adequate for the diagnosis and treatment of patients, but is rarely of such a detailed or sophisticated nature to provide more than the most general scientific background for specific research endeavors. Most of them will have had no training in the discipline of the laboratory, in the design and execution of experiments, in the understanding of complex instruments, or in the use of research techniques. In short, if they are to become serious and productive research scientists, they need to be trained for a second career.

For the potential clinical investigator, the option of further training competes with practice opportunities in which starting salaries of $35,000-$45,000 may not be unusual. In addition, the major finding of a recent study is that the financial return to the post-M.D. who has undertaken training prior to accepting regular employment on a medical faculty or as a researcher at NIH is less than for the physician in private practice (Scheffler, 1975). Training in each of the three career situations is shown to produce an economic net loss to the trainee over a lifetime. Moreover, the present value of the net loss is quite large, increases with length of training, and varies by specialty. Market forces will not draw this group of potential investigators into research.

Another form of financial deterrent, documented in interviews with training program directors, is instability of support (AAMC, 1977). A recurrent pattern of fiscal uncertainty has emerged in recent years, which can be ascribed in part to legislative delays or to attempts to cut back traditional forms of research training support. The training year generally begins on July 1. Most resident physicians start to make plans the preceding October, when, as a result of fiscal uncertainty, it is difficult to assure prospective trainees that funds will be available for the coming July. Moreover, the young post-M.D. is frequently reluctant to enter a training program when the outlook is unclear for support to complete the training or for support of research at the end of the training period. Another financial disincentive reported by training program directors is the unrealistically low fellowship stipend. At current levels, many first-year research fellows earn less than they did in the preceding year as residents.

There are increasing indications that the young physician may be turning away from clinical research as an attractive career option. Physician-investigators represented 43.9 percent of all first-time principal investigators on NIH research grants in FY 1966 (Douglass and James, 1973; Challoner, 1976). That percentage dropped to 22.3 percent in FY 1975. Concomitantly, there was also a decrease in absolute numbers of physicians as first-time principal investigators from 471 to 305, even though the total number of grants from which these percentages are derived had increased over the same period of time. Although it is possible that some of these M.D.'s were receiving support on program project and center grants, the change is consistent with a steady reduction since 1968 in both the actual numbers and percentage of active physicians reporting their activity to the AMA as being primarily research-related (Table 5.1).

In addition to the financial deterrent, other factors contribute to the apparently declining attractiveness of a

TABLE 5.1 Current Trends in Supply/Demand Indicators in the Clinical Sciences

	1971	1975	Average Annual Growth Rate 1971-75
Supply indicators:			
Professional doctorates participating in NIH training programs:			
Total in training	4,726[a]	3,360	-8.2%
New starts	1,541	1,549 (1973)	0.3% (197[illegible]-73)
Proportion of clinical trainees spending full time on research[b]	15.6% (1973)	15.4% (1977)	-0.3% (1973-77)
Demand indicators:			
Total R and D expenditures in medical schools (1967 $)	$393 million	$490 million	5.7%
Medical service funds (1967 $)	$ 94 million	$193 million	19.7%
Budgeted vacancies:			
Clinical departments	982	1,564	12.3%
Basic science departments in medical schools	508	609	4.6%
Labor force:			
M.D.'s primarily engaged in research	10,898	7,944	-7.6%
Full-time faculty in clinical departments	18,451	26,[illegible]80	9.2%
Enrollment:			
Medical students	40,487	53,143	7.0%
Other medical student equivalents	57,525	89,095	11.6%
Total	98,012	142,238	9.8%

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[a] Includes an unknown percentage of trainees who were in predominantly clinical training programs.

[b] In a selected sample of eight medical schools interviewed by the AAMC in 1977.

SOURCES: AMA (1963-76), JAMA (1960-75), NIH (1976 data book).

career in clinical research. Testimony at the public meeting of the Committee emphasized the effect of increased emphasis on the training of primary-care physicians. From time of entry into medical school, students are exposed to social pressure to pursue careers in direct patient care, especially in the primary-care fields. These laudable social goals reduce even further the already small number of students with a potential interest in research and teaching. Even in the most research-oriented medical institutions only10 to 12 percent of medical students have chosen research careers (Public Health Service, 1976b, p. 13). Moreover, there is evidence to suggest that academic careers are viewed with increasing disfavor by students and house officers (AAMC, 1977).

There is an absence of data to document or to measure the changes that may be occurring in the supply of clinical investigators. Unlike internships and residencies, fellowships and other advanced training programs in the clinical sciences are not approved by an accreditation body with record-keeping responsibilities. In addition, there is no common nomenclature for the various types of trainees, who may be called senior residents, fellows, postdoctoral trainees, etc. No systematic study of the number in training or their sources of support has been conducted, although a number of specialty groups have looked at parts of the problem. To that end, under the Committee's sponsorship, the AAMC undertook recently to examine various aspects of the subject, such as problems of nomenclature and definition, number and distribution of research trainees by specialty, variation in stipends, mix of professional activities, and sources of support.

The AAMC, in a preliminary report, has described a method of estimating the number of advanced clinical trainees engaged in research. The method makes use of two data sources from an Institute of Medicine study (IOM, 1976): (1) the National Survey Questionnaire and (2) the House Officer Activity Analysis . The former measured the total number of trainees in certain broad specialty areas in teaching-hospital respondents. The latter consisted of a log-diary study of the professional activities of house staff (including fellows) at a sample of 96 of these teaching hospitals. By determining the proportion of research trainees in the sample hospitals and applying it to the number of trainees in the national survey, an estimate was made of both the number of research trainees and the number of full-time equivalent research trainees--2,657 and 1,746, respectively.

The information from the Institute of Medicine is applicable to the 1974-75 academic year. There are no earlier or later data with which to make comparisons to determine the changes that may be occurring with respect to research activities by clinical science trainees. The AAMC is therefore attempting through interviews with training program directors, to determine whether clinical science trainee research activities have changed over a five-year period.

The data from the study, as well as issues emerging from interviews with numerous representatives of academic medical centers (e.g., training program directors, department chairmen), will be included in the Committee's 1978 report.

OUTLOOK FOR THE CLINICAL SCIENCES

The available data substantiate the impressions of a continued strong demand for clinical investigators and a diminishing amount of research activity on the part of the physician population. From 1971 through 1975, the latest year for which data are available, the number of physicians reporting research as their primary activity has declined by more than 7 percent annually (Table 5.1).

At the same time, the indicators of demand for clinical investigators continue to move upward. R and D expenditures in medical schools are expanding at more than 5 percent per year, medical student enrollment is up more than 7 percent per year, and total medical school enrollment including graduate student enrollment in basic sciences programs, nursing programs, and students in the allied health professions, is growing even faster.

In the following sections a model is presented for estimating the future needs for clinical faculty in medical schools. In developing this model, it is recognized that many clinical faculty members are not engaged in clinical research, and that the involvement of clinical faculty in patient care activities is both significant and increasing. The recent sharp increases in medical school funds derived from service and patient care activities reinforce the impression that many full-time clinical faculty members may be spending relatively little time in clinical investigation. This is because of the many demands now placed on university medical centers and teaching hospitals to become more involved in the health care system of their local communities.

At this stage of the development of the model, it is not possible to measure the impact of increasing patient care activity on the demand for clinical faculty, important as it has been. What can be observed in the data is that changes in medical school enrollments, and federal R and D expenditures by those schools, have been correlated with changes in total clinical faculty. This reflects in part recent increases in the number of medical schools as well as progressive growth of enrollment in existing schools. Thus this relationship, while not an absolute guide to future needs for the reasons cited, does provide a useful departure point for developing projections of future need based on a simplified set of assumptions.[1] For purposes of this model, "clinical faculty" is used synonymously with "clinical investigators," although in reality it is recognized that many clinical faculty members do not engage in research to any signficant degree. Further work with this model will attempt to refine this point as the data permit.

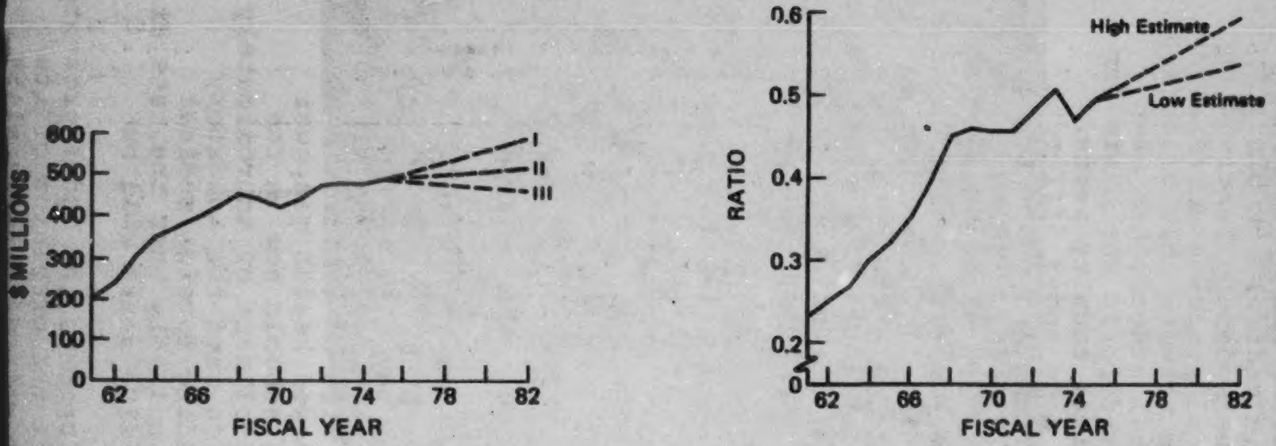
The essential variable to be predicted by the model is the size of the clinical faculty in medical schools (CF). Enrollment is incorporated into the model by forming the ratio of clinical faculty to medical students (CF/M). As noted above, a strong relationship between this ratio and real R and D expenditures in medical schools has been observed over the 1961-75 period and forms the basis for making projections of future clinical faculty needs.

Projections to 1982 have been made under different assumptions about medical student enrollment and R and D expenditures in medical schools. A high, middle, and low assumption has been made in each case. Figure 5.1 illustrates the past behavior of the variables and shows the effects of these assumptions. Table 5.2 shows the projected size and growth rate of clinical faculty under the nine assumptions due to faculty expansion alone. Provision must also be made for replacement needs, in Table 5.3, using Cartter's (1976) estimated annual attrition rate of 1.3 percent of total faculty.

Under the highest combination of assumptions (IA), which the Committee believes are quite improbable, the projected annual increase in clinical faculty would be about 3,750 individuals, or more than a 9 percent annual growth rate. Under the middle set of assumptions (IIB), approximately 2,000 new clinical faculty members would be needed each year, which is about the average annual increment in clinical faculty that has occurred since 1971. Under the low set of assumptions (IIIC), an estimated 750 new clinical faculty members would be needed each year up to 1982.

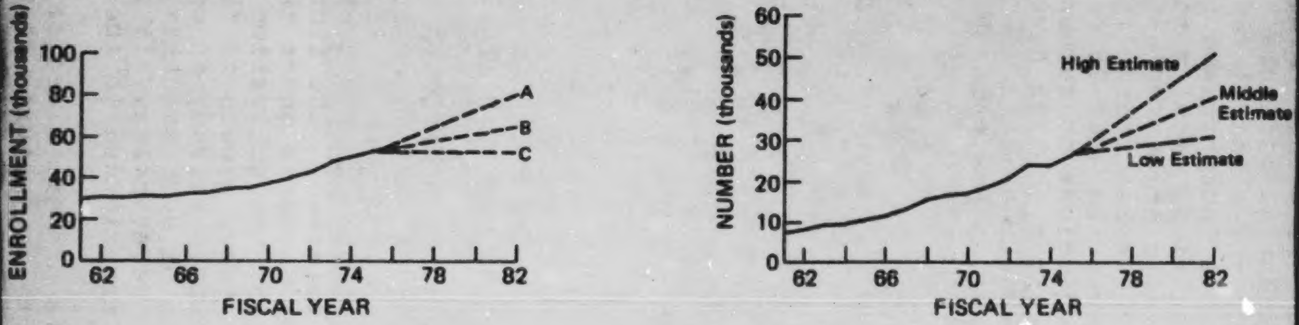
The Committee believes that the lower projections of future demands for clinical faculty resulting from the above assumptions seem more realistic. Continued increase in medical school enrollment with a leveling-off in five-seven years is foreseen. The increase will be stimulated by capitation payments under the renewed health manpower legislation, the activation of 10 schools now in the planning stage, growth to full enrollment of approximately 10 new schools already in operation, and the mandatory absorption of U.S. students attending foreign medical schools. Nevertheless, it seems unlikely that the rate of increase experienced in the last five years will be sustained.

In its present state of development, the model presented above contains features that limit the precision of its estimates. The question has been raised, for example, whether the growth in full-time clinical faculty can be fully explained by medical student enrollment or research



a) R and D Expenditures in Medical Schools (1967 $)

(b) Clinical Faculty/Medical Student Ratio



(c) Medical Students

(d) Clinical Faculty in Medical Schools

FIGURE 5.1 Medical school R and D expenditures, enrollment, and clinical faculty, 1961-75, with projections to 1982. Based on data from JAMA (1960-75). See Appendix G.

TABLE 5.2 Projected Growth in Clinical Faculty, 1975-82, Based on Projections of Medical School Enrollment and R and D Expenditures

Assumptions about Medical Student Enrollment		Assumptions about Real R and D Expenditures in Medical Schools		
		I Will expand at 3%/yr to $551 million in 1979[a]	II Will expand at 1.5%/yr to $520 million in 1979[a]	III Will remain at approximately the 1975 level of $490 million until 1979[a]
A. Will continue to grow at present rate (7%/yr), reaching 85,300 students by 1982	Expected size of clinical faculty in medical schools (CF) in 1982	49,118	47,009	44,969
	Annual growth rate in CF from 1975 to 1982	9.3%	8.7%	8.0%
B. Will grow at one-half the present rate, reaching 68,000 medical students by 1982	Expected size of clinical faculty in medical schools (CF) in 1982	39,154	37,475	35,850
	Annual growth rate in CF from 1975 to 1982	5.9%	5.2%	4.5%
C. Will show essentially no growth from 1975 to 1982, leveling off at 55,000 medical students	Expected size of clinical faculty in medical schools (CF) in 1982	31,669	30,311	28,996
	Annual growth rate in CF from 1975 to 1982	2.7%	2.1%	1.4%

[a] These projections are based on a relationship between CF/M and R and D expenditures with a three-year lag (see note 1). Therefore, the estimated 1982 value of CF/M is derived from the estimated value of R and D in 1979.

TABLE 5.3 Projected Average Annual Increment in Clinical Faculty Due to Expansion and Replacement

Assumptions about Medical Student Enrollment		Assumptions about Real R and D Expenditures in Medical Schools		
		I	II	III
		Will expand at 3%/yr to $551 million in 1979[a]	Will expand at 1.5%/yr to $520 million in 1979[a]	Will remain at approximately the 1975 level of $490 million until 1979[a]
A. Will continue to grow at present rate (7%/yr), reaching 85,300 students by 1982	Average annual increment due to faculty expansion	3,263	2,961	2,670
	Annual replacement needs due to death and retirement[b]	490	476	463
	Expected total annual increment in clinical faculty	3,753	3,437	3,133
B. Will grow at one-half the present rate, reaching 68,000 medical students by 1982	Average annual increment due to faculty expansion	1,839	1,599	1,367
	Annual replacement needs due to death and retirement[b]	425	414	404
	Expected total annual increment in clinical faculty	2,264	2,013	1,771
C. Will show essentially no growth from 1975 to 1982, leveling off at 55,000 medical students	Average annual increment due to faculty expansion	770	576	388
	Annual replacement needs due to death and retirement[b]	377	368	359
	Expected total annual increment in clinical faculty	1,147	944	747

[a] These projections are based on a relationship between CF/M and R and D expenditures with a three-year lag (see note 1). Therefore, the estimated 1982 value of CF/M is derived from the estimated value of R and D in 1979.

[b] Based on an estimated replacement rate of 1.3% annually due to death and retirement (Cartter, 1976, p. 121).

expenditures. An equally tenable explanation might be the expanded involvement of medical schools in Health Maintenance Organizations, VA hospitals, and other patient-related activities. This interpretation is reinforced by studies performed by the AAMC for the President's Biomedical Research Panel, which show that for the past decade, while there has been a 10 percent increase in real dollars for research, there has also been a 40 percent rise in patient-care income and a doubling of state support for teaching. These findings lead to the inference that the substantial faculty expansion in academic medical centers was related to the provision of clinical care and added responsibility for the teaching of other health professions students. For these reasons, the Committee believes it important in its future studies to distinguish between clinical investigators, as the essential variable to be predicted, and total clinical faculty.

The variable used to measure R and D expenditures also presents a problem. The Committee would like to measure only R and D expenditures in clinical departments, but the data collected to date are not that refined. Although the Committee recognizes the difficulty of factoring out the clinical component of total R and D expenditures, it feels the effort to do so would be justified by the improvement in the model and will make such an effort over the coming year.

Inclusion in the model of factors accounting for age composition and faculty turnover rate would also add to its precision and usefulness in estimating demand.

Attempts to improve and refine the model, as indicated above, will be supplemented by efforts to test its effectiveness by comparison with estimates of clinical faculty growth obtained through a canvassing of deans.

The reservations concerning the present model place limitations on its precision for estimating future needs. It does provide, however, a guide to the direction the market for clinical investigators is likely to follow.

Whether or not there are enough clinical trainees in the pipeline to fill the vacancies that are expected to occur under any of the assumptions is quite difficult to determine with the information now available. There is good information only about one segment of the pipeline, the NIH training programs. These programs are the major source of support for the training of clinical investigators, but a smaller amount of support is available from other sources, such as private foundations, institutional funds, state and local governments, and other federal agencies. The amount of the latter that is available for research training in the clinical sciences, rather than training for clinical practice, is unknown at this time.

If the number of individuals with professional degrees participating in the NIH training programs is indicative of national patterns, then instead of a buildup of clinical postdoctorals, as in the biomedical and behavioral fields, there has been a gradual decline. The trend in the number of professional postdoctorals entering the NIH training program has declined from 2,006 new starts in 1968 to 1,549 in 1973, a reduction of 23 percent, or 5 percent annually (Table 5.4).

Although there is inadequate information on the total number of clinical research trainees in the pipeline, it would appear that clinical investigators are not being produced in sufficient quantity to satisfy the needs of medical school faculties. Budgeted vacancies (i.e., positions for which a budgetary provision exists) in clinical departments have been increasing at more than 12 percent per year since 1971. Furthermore, the pattern of vacancies in clinical departments is quite similar to the pattern of R and D expenditures in medical schools (in constant dollars), indicating once again the relationship between research activity and the demand for clinical investigators (Figure 5.2).

Numerical Levels

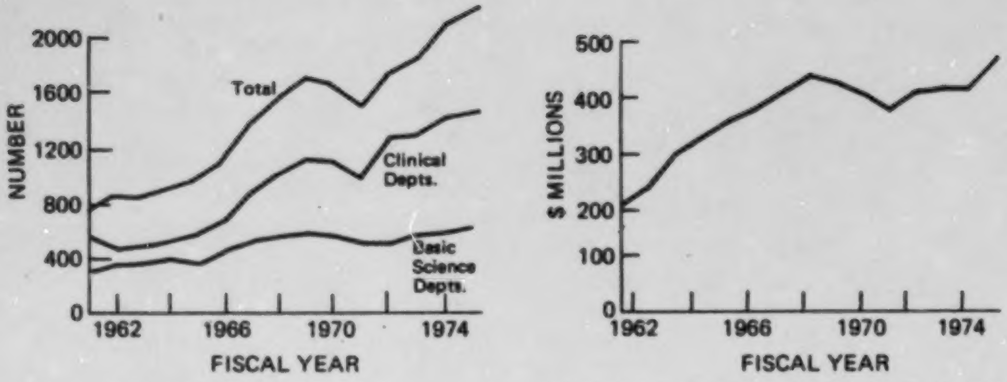
The Committee in its 1976 report detected trends in supply and demand that, if continued, could lead to shortages of qualified M.D. researchers. That possibility led the Committee to recommend for FY 1977 a 10 percent increase in the number of trainees and fellows at the postdoctoral level, compared with the number funded by NIH/ADAMHA in FY 1975. The Committee finds cause for concern in the fact that actual postdoctoral awards by NIH in the clinical sciences in FY 1976 provided for a total of 1,682 trainees and fellows, compared with the recommendation for 2,675, a reduction of 37 percent from the recommended level (Table 5.5). This decrease in the clinical sciences exceeded that for each of the other broad areas covered by the 1976 report. Information that would unequivocally account for this decrease is not available, a circumstance that serves to reinforce the Committee's concern.

Several factors merit attention in attempting to explain the reduction. First, there is the possibility of nonutilization of traineeship positions. If positions were vacant, did the vacancies reflect a lack of qualified applicants or the effect of such factors as unrealistic timing of award notifications? The Committee notes in this connection that there are reporting problems peculiar to institutional awards. To avoid confusion it is necessary to distinguish between positions alloted to the training program and actual appointments to these positions. Data for 1976, for example, mainly reflect numbers of traineeship positions awarded rather than individual appointments. Figures on the latter will generally not be available to the agencies before fall 1977, and hence it will not be known

TABLE 5.4 NIH Post-M.D. or Post-M.D./Ph.D. Trainees and Fellows, New Starts 1938-73[a]

Year	Trainees	Fellows	Total
1938-48		110	110
1949		117	117
1950	2	126	128
1951	9	60	69
1952	5	45	50
1953	0	90	90
1954	6	98	104
1955	3	107	110
1956	4	135	139
1957	111	168	279
1958	489	111	600
1959	720	152	872
1960	1182	228	1410
1961	1545	294	1839
1962	1873	278	2151
1963	1808	341	2149
1964	1752	337	2089
1965	1789	366	2155
1966	1786	277	2063
1967	1859	183	2042
1968	1772	234	2006
1969	1612	210	1822
1970	1547	139	1686
1971	1436	105	1541
1972	1431	93	1524
1973	1421	128	1549

[a] From NRC (1975a). "M.D." includes all professional doctorates, e.g., M.D.'s, D.V.M.'s, D.D.S.'s, etc. "Ph.D." includes all academic doctorates, e.g., Ph.D.'s, D.Sc.'s, D.Ph.'s, etc.



(a) Budgeted Vacancies

(b) R and D Expenditures in Medical Schools (1967 $)

FIGURE 5.2 Medical school budgeted vacancies and R and D expenditures. Based on data from JAMA (1960-75). See Appendix G.

TABLE 5.5 Committee Recommendations for NIH and ADAMHA Predoctoral and Postdoctoral Traineeship and Fellowship Awards in the Clinical Sciences

Agency Awards and Committee Recommendations	Fiscal Year						
	1975	1976	1977	1978	1979	1980	1981
Actual awards							
Total	*3095*	*2289*[a]					
Pre	*543*	*607*					
Post	*2552*	*1682*					
1976 recommendations							
Total		3256	3400	3400			
Pre		581	600	600			
Post		2675	2800	2800			
1977 recommendations							
Total					3500	3500	3500
Pre					700	700	700
Post					2800	2800	2800

[a] FY 1976 awards were reported in 1977 subsequent to the release of the 1976 report of the Committee.

until then whether or not the position was filled by a post-M.D. trainee. Conclusions regarding utilization must therefore be withheld until that time. Second, some NIH Institutes described their areas of interest in a way that may inadvertently have de-emphasized clinical research in their NRSA program announcements. At least one Instituteintentionally followed this course in order to discourage applications for training for clinical practice. A third factor, but one which is not unique to the clinical sciences, is inadequate funding. The Committee is aware that difficulties arose in FY 1976 as a result of the need to operate under a continuing resolution. Fourth, an unknown number of post-M.D. awards may have been improperly classified under the basic biomedical sciences, which showed an increase of about 500 postdoctoral awards from 1975 to 1976.

In addition to program data to be obtained from NIH/ADAMHA, the Committee will in the coming year carefully examine the policy implications of payback provisions, disparities between residents' salaries and training stipend levels, and social pressures for training in primary care as they impinge upon career choice in clinical research.

Recommendation. In the absence of any evidence that would compel a change in its previous findings, the Committee reiterates its prior recommendation that 2,800 postdoctoral trainees and fellows be funded in the clinical sciences by the end of FY 1979, and that this level be maintained through FY 1981. Since the average trainee is in training for about two years, this recommended level would produce approximately 1,400 trained clinical investigators per year, a number that is consistent with the lower estimates of demand.

Recommendation. The Committee recommends that program announcements be worded in a manner that explicitly encourages applications for training in the clinical sciences.

Traineeships/Fellowships

The greatest need, in the Committee's view, is for high-quality training programs specifically designed to offer the rigorous scientific background necessary to produce a clinician with the skills of a productive research scientist. These programs should have academic breadth, organized academic content and requirements, and substantial opportunity for conduct of a research project under competent direction. The training programs, which may frequently be multidepartmental, should last sufficiently long to equip the trainee for a serious research career. Two or perhaps three years are required in most cases to accomplish the course work, seminar participation, and independent study and research necessary to produce a clinical investigator.

The most effective support mechanism for such programs is the institutional training grant. Aside from the general characteristics described in Chapter 1, it is particularly designed to meet the needs of the post-M.D. whose doctoral training is limited in research participation. For these individuals, the purpose of training in the clinical science is more to instill the methodologies and techniques of research than to expand or sharpen tools that have already been acquired. That purpose is best served through a mechanism that strengthens the research environment by providing funds for courses, seminars, special lectures, and supplies and equipment.

The individual fellowship is better suited for the post-M.D. with prior research experience. The more experienced applicants can exercise greater latitude in selecting a training site, since the choice is not restricted to departments with training grants. Also, they may have a more precise understanding of their needs and the availability of training to meet these needs. A serious limitation, however, is the time lag between application and award. This lag, recently aggravated by the requirement of prior review by NIH/ADAMHA Advisory Councils, is about nine months. The disadvantage may be seen, for example, in the case of a third-year pediatrics resident, who must decide not only in which problem area to train, but also on a sponsor and research project approximately a year before training begins. An institutional training grant, by contrast, enables the program director to accept a suitable applicant with a minimum of delay. In addition to the long lead time, the individual fellowship has a disadvantage in applying a single priority rating scale to the post-M.D. just entering research training and the post-Ph.D. prepared to function as a research associate.

Recommendation. The Committee recommends that most of the NIH/ADAMHA funding for post-M.D.'s should be in the form of training grants. It recommends that the appropriate proportion of fellowships is between 15 and 30 percent, a range that is in keeping with the proportions observed in the last two years.

Medical Scientist Training Program

The Committee again took special note of the Medical Scientist Training Program, a course of study designed to provide combined medical and scientific training leading to the award of both the M.D. and Ph.D. degrees. The program offers to a limited number of carefully selected trainees a background and perspective that are uniquely valuable in the conduct of biomedical research. Trainees are permitted an unusual degree of flexibility in developing their investigative interests. Disciplinary lines can be crossed to utilize, for example, the programs of a basic science department and the research effort of a clinical specialty. Sponsored by the NIGMS, the Medical Scientist Training Program has expanded slowly since its start in 1964-65 to a total of 23 grants, which provide approximately 600 traineeship positions. Combined-degree programs incorporate economies of teaching by eliminating duplication between medical and graduate curricula. As a result, most of the programs require six to seven years for completion. To date a total of 171 trainees have completed the program, most of whom are currently engaged in clinical residency training. Follow-up data have been gathered by NIGMS staff on 36 graduates who have applied for research grants or postdoctoral fellowships. The data indicate that one-half of these applications fell in the upper 10 percent of priority scores for these categories of NIH award.

The nature of the research that is likely to be performed by scientists holding the combined degrees is difficult to predict, since they have access to both basic and clinical research activities. Limited experience to date would suggest an equal distribution between basic science and clinical departments. The Committee believes that they can bring to a basic science department a point of view that on the one hand facilitates relating their research to clinical medicine and on the other hand allows exploration in depth of selected medical problems encountered initially at the bedside. An important benefit of this type of program, both to the individual trainee and to the faculty, is the encouragement and provision for interdisciplinary contacts between members of the basic science departments and those of the clinical departments.

Recommendation. The Committee recommends annual increases of approximately 10 percent for FY 1978 and for FY 1979 in MSTP training positions, using the number of 600 authorized for FY 1977 as the base. These recommended levels will accommodate the scheduled escalation of positions in current grants, as well as a modest increase in the number of institutions participating in the program.

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FOOTNOTE

1. This relationship is as follows: $CF/M = 0.13643 + 7.9739 \times 10^{-4} (MR\&D_{-3})$, where CF = size of full-time clinical faculty in medical schools, M = medical student enrollment, and $MR\&D_{-3}$ = R and D expenditures in medical schools, lagged three years (millions of 1967 $). The multiple correlation coefficient for this regression equation based on data for the period 1961-75 is 0.98.

6. HEALTH SERVICES RESEARCH

In recent years, expenditures for health care have expanded enormously. Each year has also seen new legislation vitally affecting the organization and provision of health care services. At the same time, research appropriations earmarked for understanding how the health care system works and how it can be made to function more effectively in the future have experienced a precipitous decline.

Health services research, unlike research on cancer, heart disease, or mental illness, does not have a dramatic purpose that speaks to the direct experience of millions of people. Indeed, the public has often been apathetic toward the ability of organized services to meet the needs of the sick and diseased (Shryock, 1966, 1969).

Nor does health services research have a large, well-organized constituency to advocate funding for it. Health services research is a hybrid of disciplines that are unified only by common research goals.

Health services research seeks to examine the organization and performance of health care delivery systems and to open health care policy to research which analyzes the components of this system (Black, 1974). At a time when economic constraints threaten our ability to bring quality health programs and personnel to individuals and families throughout our nation, it is health services research that seeks to devise more sensible allocations of our collective and finite health resources (White, 1975; White and Henderson, 1976). Through the application of quantitative and systematic research methods, health services research is concerned ultimately with the organization, utilization, and outcomes of health care.[1]

Even well-informed people, both in government and in the scientific professions, have insufficient knowledge as to what health services research is, how it is performed, or the range of disciplines involved in it. Because of this lack of awareness, they are unfamiliar with the special problems of health services research and the talents and resources that are necessary.

At the same time there has been both a legislative and an administrative demand for improvements in the delivery of health care. Improving a system that is as complicated, diffuse, and poorly understood as the U.S. health care system cannot be done effectively and safely without a much more substantial information and knowledge bases and analyses of the dynamics of the present system.

Prior to a discussion of research training needs in this area, the Committee examines what health services research is and what role it can have in providing medical and other health-care services to the population.

ORIGINS OF FEDERAL SUPPORT

Health care delivery systems are shaped by the historical contexts in which they develop. Such factors as economic organization, ideological forces, available technologies and pre-existing professional organization affect access to medical care, distribution of services, and ultimately the quality of health care (Mechanic, 1975). Indeed, in our own nation, health care policy and delivery systems development are determined today by administrative decisions that must balance "the perceived medical needs of the people, the scientific realities of today and the available money in a political climate which insists on distributional equity" (White, 1977).

Health is the nation's third largest industry today (Altman and Eichenholz, 1976). It is estimated that public and private expenditures for health services and supplies in the U.S. grew from $12 billion, or 4.6 percent of the gross national product (GNP) in 1950, to $139 billion, or 8.6 percent of the GNP, in 1976. At the same time there has been a growth in the proportion of total health outlays borne by the federal government. In FY 1976, for example, the federal government provided support for more than 60 percent of all medical research costs, 45 percent of the costs to construct and maintain health facilities, 40 percent of medical education costs, and 30 percent of the costs for health services. This represents a growth of the federal share of total spending from 12 percent in 1950 to 28 percent in 1976 (Office of Management and Budget, Special Budget Analysis, 1977).

Implementation of large-scale federal health programs calls for a knowledge of the unique health needs of a region or population and requires an accurate estimation of the need for new health care services, facilities, and personnel. The federal government has found it necessary to provide for R and D activities useful in guiding this policy and planning process (President's Science Advisory Committee, 1972). Indeed, it was in the face of critical health care needs that the federal government launched the first major program of health services R and D in 1955 when Congress appropriated sufficient funds to improve the organization and design of hospitals and related health services.[2]

In the absence of specialists to conduct health services research, the government has had to rely on scientists and health professionals from a variety of fields to redirect their activities and interests to the problems of health services development (Eichhorn and Bice,1973). As a result, a body of knowledge has accumulated over the years, and research techniques have been developed to the point that health services research is now considered a distinct area of scientific inquiry.

With the development of its theories and methods, health services research has been established in academic institutions through a limited number of programs of training. It is at these institutions and research centers that individuals can gain expertise at both the predoctoral and postdoctoral levels in the problems and methods of health services research. Hence, for the first time it has been possible to foster the development of a cadre of investigators trained to address the complex questions of health care delivery.

Because of the absence of a supportive constituency, federal support for these programs of training has been diffuse and sporadic.[3] It is the hope of the Committee that a description of the current climate of federal support for this research endeavor, coupled with a discussion of the role this research and training can have in addressing the urgent health care questions today, will lead to a continuity of commitment by the federal government to the development of health services research in the future.

NATIONAL CENTER FOR HEALTH SERVICES RESEARCH

The Congressional appropriations of 1955, which permitted the implementation of the demonstration provisions of the Hill-Burton Act, launched health services research by the federal government. By the late 1950's, the NIH also supported a number of noncategorical health services research projects under the general research authority of the Public Health Service Act (PHS Act), and by 1963 the Bureau of State Services began the first organized extramural research program in community health services (Sanazarro, 1973).

The proliferation of these federal programs led the White House Conference on Health in 1965 to recommend the establishment of a single entity to coordinate these activities (PSAC, 1965). Consolidation was achieved in 1967 when Congress directed the Secretary to establish a center for health services research, demonstration and development programs, and the training of research personnel in this area.[4] This was carried out by an order of the Secretary in

1968 that established the National Center for Health Services Research and Development (NCHSRD).[5]

The NCHSRD was formed initially by a transfer of existing programs from the Divisions of Community Health Service, Medical Care Administration, Hospital and Medical Facilities, and from other units of the Department of Health, Education and Welfare (HEW). The diversity and complexity of tasks that resulted from this consolidation is reflected in this statement of goals:

> This new program of health services research and development offers a vehicle through which alternative means for maintaining and increasing the availability of good health care can be achieved; the productivity of health manpower can be increased; better hospitals and nursing homes can be designed, and a full range of alternatives to costly institutional care can be developed. (U.S. Congress, 1967)

The basic charge to the Center, however, was threefold: to improve access to health care, to guarantee quality, and to moderate rising costs on a national scale (Sanazarro, 1973). As a first step in meeting these goals the Center laid out a program of R and D, with a heavy emphasis on development, to identify major health care problems and to assure cooperation from the public and private sectors.

Largely through demonstration activities, the Center supported projects to train and deploy physician extenders, to test such new cost containment and financing methods as all-inclusive rate reimbursement, to examine the potential of computer technology on health care delivery, and to standardize the health services data systems within states and nationwide.[6]

In 1974, Congress clarified the role of the Center through the Health Services Research, Health Statistics and Medical Libraries Act (PL 93-353) (Fox, 1976). Today its intramural and extramural research is directed toward the following areas: quality of care; inflation, productivity, and costs; health care and the disadvantaged; health manpower; health insurance; planning and regulation; ambulatory care and emergency medical services; and long-term care (NCHSR, 1976).

As Figure 6.1 indicates, budget constraints severely limit the work of the Center, making difficult the tasks of providing a stable program of research and of demonstrating the contributions of health services research to health care policy.

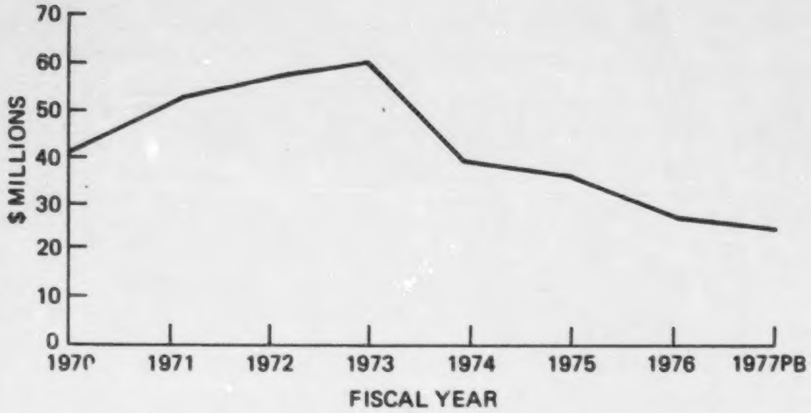

FIGURE 6.1 NCHSR research funds by fiscal year. PB refers to the level of funding recommended by the Administration (President's Budget). From PHS (1976a).

HEALTH SERVICES RESEARCH IN ADAMHA

Federal programs to provide mental health care services to the nation represent a dramatic departure from traditional service delivery models and generate for health services research a different set of challenges and research problems.

In its 1961 report, the Joint Commission on Mental Illness and Health called for one fully-staffed full-time mental health clinic for each 50,000 of the population (Report of the Commission on Mental Illness and Health, 1961). With the enactment of the Mental Retardation Facilities and Community Mental Health Center Construction Act in 1963 (PL 88-164), the federal government became committed for the first time to provide opportunities to treat emotionally and mentally disturbed persons, who might otherwise require hospitalization, in a community setting. Community Mental Health Centers (CMHC's) were also envisioned by some as "social change agents" instrumental in lowering the incidence of mental disorder (Caplan, 1964; Arnhoff, 1975; Robin and Wagenfeld, 1977). Over 600 CMHC's are in place today.

Mental health services research personnel are challenged today to provide information on the social, economic, and behavioral factors that render mental health care delivery effective. In the face of serious economic conditions, such information will assist the health planner to devise a coherent federal policy for mental health that will permit the optimum allocation of limited federal resources (PHS, 1976a).

Since 1972, there has also been an increasing commitment to provide federally funded programs to treat alcoholism and drug addiction in a variety of settings (ADAMHA, 1976). The challenges that face health services research personnel are largely similar to those that face individuals studying mental health care delivery. However, the absence of a knowledge base regarding the basis for these addictive behaviors increases the complexity--and importance--of the tasks facing these research personnel.

ADAMHA's interest to improve these programs of care is reflected not only in the areas of research and evaluation supported at this time, but also is evident in the current expansion of research training in this area within the framework of the NRSA Act.

HEALTH SERVICES RESEARCH IN THE NIH

Health information systems can assist individuals operating a variety of health services to gain access to information relevant to the performance of the health services (Alderson, 1974). While it is clear that it is not the goal of the National Library of Medicine (NLM) to enhance the efficiency of health services as such, the work of the NLM to develop computer technology for disseminating medical and other information serves as an important resource for the development of health care programs throughout the nation. The Committee notes that the NLM has provided a limited program of training in the area of computer technology and information science under the auspices of the Medical Libraries Assistance Act in recent years.

CURRENT TRENDS IN HEALTH SERVICES RESEARCH

The public perceives a variety of serious problems in medical care today. These include the inability to get personal medical care, the rising costs of hospital care, the lack of good medical care for common problems despite the proliferation of advanced technologies to prolong life, evidence of difficulties with Medicare, and many others. Health services research seeks to address these and a wide variety of other problems.

In the wake of the social programs of the 1960's for example, health services research has begun to investigate the access to and use of health services by the aged, the economically disadvantaged, minorities, and geographically isolated populations. One recent investigation (Haggerty et al., 1975) has shown that neighborhood health centers increase the access and use of health services by the poor, with a consequent reduction in use of hospital admissions and emergency-room use.

In the quality assurance field, a recent study demonstrated that education is not as effective as financial incentives in changing the behavior of doctors (Brook and Williams, 1977). A group of physicians was found to be administering intramuscular injections routinely to Medicaid patients, despite the fact that peer physicians had determined these injections to be unnecessary. It was not until the Medicaid program denied payment of reimbursement claims that a reduction was noticed in the number of injections reported.

An increasing emphasis has been placed on the problems of health costs in recent years. Economists have demonstrated that higher inflation has meant that low-income families and the elderly--for whom health care budgets have failed to keep pace with services costs--are devoting a larger share of their limited incomes to health costs (Davis, 1976). Evidence has also accrued that suggests that certificate-of-need laws have successfully curbed hospital bed expansion, but have also motivated hospitals to accelerate investment in costly services, facilities, and equipment (Salkever and Bice, 1976). Research on these and related questions may lead to a better understanding of ways to abate soaring health-care costs.

Although large-scale investment in sophisticated new technologies has contributed to rising health-care costs in general, the application of computer technology to hospital information systems may actually be a cost-effective way to facilitate the flow of information within the hospital while reducing the time and effort spent to store and retrieve such information. Recent studies have demonstrated, for example, the utility of medical information systems in ambulatory care settings (Barnett, 1976).

Just as clinical research seeks to test the efficacy of a new form of treatment on patients manifesting a particular disorder, health services research seeks to improve the effectiveness of applying the treatment to those who can benefit from it. A recent health services research study has shown, for example, that the U.S. population has yet to benefit from the use of drugs and treatments for essential hypertension, despite the demonstrated efficacy of the treatment (Weinstein and Stason, 1976). Such research assists the specification of policies and priorities for continued federal investment in health care.

Finally, in the area of alcoholism and drug abuse, health services research has led to the establishment of occupational alcoholism services in the industrial setting and to the creation of pilot programs to demonstrate methods to return recovered drug addicts to productive employment (ADAMHA, 1975).

THE NATURE OF HEALTH SERVICES RESEARCH TRAINING

Health services research training can be offered to a wide range of individuals, including those who hold baccalaureates, masters degrees, academic doctorates, professional doctorates, and other health professionals. Training may constitute work towards a masters degree, a research doctorate, or postdoctoral training in (1) the behavioral sciences (including sociology, anthropology, psychology, and population studies); (2) the biomedical sciences (including biostatistics, bioengineering, and epidemiology); (3) the social sciences (primarily economics and political sciences); (4) public health (including environmental health and maternal and child health); and (5) in other research fields (such as operations research, health administration, and health education).

The aspect of health services research training that distinguishes it from other types of research training is the nature of the primary research problem. The health services investigator applies research methods from the discipline of training to one or more of the health services problem areas listed below:

Problem Areas in Health Services Research[7]

health facilities
health manpower

ambulatory care
dental health services
emergency health services
health services for the disadvantaged
long-term care
nursing health services
pharmacy-related health services

economics (including health insurance), inflation, cost containment and production
legal aspects of health care, including regulatory studies
quality assurance of health services
health services organization, planning and administration
utilization of health services

health services evaluation
health statistics development
health status, including indicators development

health systems analysis
health care technology and technology assessment
medical data systems

community studies related to health care
sociobehavioral aspects of health care, including compliance

Health services research training as it is offered through such health agencies as ADAMHA differs only in that the primary research problem is modified further by the delivery system being analyzed, namely the mental health services system (including substance abuse programs). Regardless of the source of research training support, however, it is the research problem that clearly characterizes the health services researcher.

CURRENT MARKET SITUATION FOR TRAINED HEALTH SERVICES RESEARCH PERSONNEL

The NCHSR has provided research training support at both the predoctoral and the postdoctoral level for over a decade.[8] Similarly, ADAMHA has provided important training in evaluation research since the latter part of the 1960's, when evaluation of the programs of mental health care gained momentum.[9] Because these programs of research training represent the first major effort by the federal government to provide funds for formal training in areas relevant to the enhancement of the health care system, the Committee sought to assess the current employment situation of a selected sample of these individuals following their training in this area of research.

Over 500 individuals were identified as having received predoctoral or postdoctoral research support through the programs of the NCHSR or ADAMHA. Of these, 396 received support through the NCHSR since FY 1970,[10], and 110 through the evaluation training programs of ADAMHA since FY 1975.

A survey instrument was developed that included both the questionnaire on training and employment in the biomedical and behavioral sciences (Chapters 3 and 4, and Supplement 6), and an additional one-page form to acquire information pertinent to the individuals specialization in health services research (see Supplement 6). Over 65 percent of the trainees surveyed responded to this questionnaire.

- Only 1.2 percent of the trainees were seeking employment at this time (Appendix H1).
- Over 65 percent were employed in educational institutions, with another 15.5 percent employed in federal, state, or local government (Appendix H2).
- About 80 percent reported that they were engaged in health services research (Appendix H3).

- Individuals engaged in health services research were rather evenly distributed among the eight broad categories of health services research specialization developed by the Committee (Appendix H4).

The programs of training supported by the NCHSR and ADAMHA may be expected to differ with respect to the areas of specialization emphasis, due to the fact that the systems of health care differ for each supporting agency. Hence, it is not surprising to find that a substantial proportion of individuals who received support from ADAMHA specialize in the sociobehavioral aspects of health services research (Table 6.1), while a number of individuals who received support from the NCHSR work on problems dealing primarily with the legal aspects of health care, quality assurance, or services organization, planning, and administration (Table 6.2). Beyond these major categories of emphasis, these individuals tend to be rather well distributed among other areas of research specialization.

The Committee has concluded that there is evidence of low unemployment among individuals who have received federal support for training in health services research and that a large majority of these individuals have found employment that permits them to engage in health services research. The Committee believes that these federally supported programs of training have been successful in providing to these individuals research skills that may be used in a variety of employment settings and on a range of problems of interest to health planners today. In summary, the Committee has concluded that current employment conditions for these trained health services research personnel are good.

ASSESSMENT OF THE LABOR FORCE

In addition to those individuals who have received federal support for training in health services research, the present supply of available personnel includes a cadre of investigators who have moved into health services research either by virtue of their employment experiences (e.g., selecting a topic for study that contributes to the enhancement of the health care system) or through some form of nonfederally supported training (e.g., selecting a thesis topic considered appropriate to studies of the health care system). Because no data base exists that can be used to estimate the magnitude of the health services research labor force, the Committee undertook a second survey directed to acquire this information.

TABLE 6.1 Primary Research Specialty[a] of Health Services Research Personnel Trained through Federal Funds (ADAMHA only)

Training Specialization		Primary Specialty Area								
Area	N	Facil./ Manpwr.	Serv.	Econ.	Legal/ Qual./ Org. & Util.	Quant.	Syst. Anal. Tech.	Socio./ Comm.	Other	No Response
TOTAL	54	1.9	5.6	14.8	5.6	22.2		40.7	7.4	1.9
Behavioral sciences	39	2.6	5.1		5.1	25.6		48.7	10.3	2.6
Biomedical sciences	2					50.0		50.0		
Social sciences	8		12.5	87.5						
Public health	3			33.3				66.7		
Other research fields	2				50.0	50.0				

[a] Research specialties represent the following areas: Facil./Manpwr.: health facilities, health manpower; Serv.: ambulatory care, dental health services, emergency health services, health services for the disadvantaged, long term care, nursing health services, pharmacy-related health services; Econ.: economics (including health insurance), inflation, cost containment and production; Legal/Qual./Org. & Util.: legal aspects of health care, including regulatory studies, quality assurance of health care services, services organization, planning and administration, utilization of health services; Quant.: evaluation research, health statistics, health status, including indicators development; Syst. Anal. Tech.: systems analysis, health care technology and technology assessment; Socio./Comm.: community studies, sociobehavioral aspects of health care, including compliance.

SOURCE: NRC, Survey of Health Services Research Personnel, Washington, D.C., 1977.

TABLE 6.2 Primary Research Specialty[a] of Health Services Research Personnel Trained through Federal Funds (HRA only)

Training Specialization		Primary Specialty Area								
Area	N	Facil./ Manpwr.	Serv.	Econ.	Legal/ Qual./ Org. & Util.	Quant.	Syst. Anal. Tech.	Socio./ Comm.	Other	No Response
TOTAL	224	9.8	17.4	9.4	28.1	11.6	4.0	12.5	6.3	.9
Behavioral sciences	95	12.6	17.9	4.2	26.3	13.7	1.1	16.8	6.3	1.1
Biomedical sciences	15		20.0		13.3	26.7	20.0	13.3	6.7	
Social sciences	20		15.0	55.0	20.0		5.0	5.0		
Public health	59	10.2	16.9	3.4	27.3	10.2	3.4	13.6	3.4	1.7
Other research fields	35	11.4	17.1	11.4	28.6	8.6	5.7	2.9	14.3	

[a] Research specialties represent the following areas: Facil./Manpwr.: health facilities, health manpower; Serv.: ambulatory care, dental health services, emergency health services, health services for the disadvantaged, long term care, nursing health services, pharmacy-related health services; Econ.: economics (including health insurance), inflation, cost containment and production; Legal/Qual./Org. & Util.: legal aspects of health care, including regulatory studies, quality assurance of health care services, services organization, planning and administration, utilization of health services; Quant.: evaluation research, health statistics, health status, including indicators development; Syst. Anal. Tech.: systems analysis, health care technology and technology assessment; Socio./Comm.: community studies, sociobehavioral aspects of health care, including compliance.

SOURCE: NRC, Survey of Health Services Research Personnel, Washington, D.C., 1977.

More than 2,000 individuals were identified for the purposes of this survey, either because they had received research grant or contract support from NCHSR sometime since FY 1960,[11] or because they had published their research findings in journals relevant to this area after 1967.[12]

The same survey instrument described in the previous section was used to gather training and employment data from this sample of personnel. More than 500 individuals could not be contacted because of inadequate addresses. Of the remaining 1,500, more than 700 responded. Because the Committee hopes to complete this study in the coming year, only preliminary data are reported below.

Of the 700 respondents, over 25 percent hold doctorates in health care professions, but reported no formal research training. The remaining respondents represented a varied distribution among types and levels of academic training, with some individuals holding baccalaureates only, some holding masters degrees, and some possessing academic doctorates.

Appendix H5 provides some information regarding the year in which formal training had been completed by these respondents. It is interesting to note that professional doctorates and individuals with baccalaureate training alone completed their education largely before 1960, whereas most of those with academic doctorates received their degree after that year for the most part.

Because these individuals completed their academic or professional training prior to the development of formal programs of training in health services research (Haggerty, 1973), it is unlikely that these individuals have had the opportunity to refine their research skills in light of current theories and methods.[13]

The Committee is aware that grave problems arise in any attempt to estimate the current available supply of health services research personnel. However, data from this survey suggest that it will be possible eventually to make some statement regarding the current employment situation of individuals who once worked in this area. The Committee views these data as a first important step in understanding the dynamics of the system.

OUTLOOK FOR THE LABOR MARKET

There is a significant awakening of awareness among government administrators today of the need to improve national programs of physical and mental health care in the face of inflation and the high costs of medical care.

New approaches to health care are being developed within a very short time frame. Plans are under way to implement as soon as possible the far-reaching network of Health Systems Agencies (HSA's), which provide an opportunity for comprehensive health planning at a local level; for Health Maintenance Organizations (HMO's) for free-market competition in health benefit plans; and for Professional Standards Review Organizations (PSRO's) to assure quality care at a low cost to the taxpayer for Medicare and Medicaid patients.

There is an important need for personnel to conduct research associated with the implementation of these and related programs to enhance health care. However, federal interest in providing research support must be tempered by the knowledge that the bulk of available health services research personnel have not had the benefit of formal training in the theories and methods that have been discussed earlier in this chapter. As a result, programs of research support may ultimately lack the availability of personnel whose expertise is of sufficient calibre to tackle sophisticated research problems relating to health care planning.

The Committee recommends the support of programs for research training to increase the number and quality of health services research personnel. The importance of quality in health services research cannot be overemphasized as the demand for improved health care is heard from all sectors of our society. This challenge can best be met through the continued development of a pool of personnel whose research skills can assure the advancement of health care.

RECOMMENDATIONS

Health services research is an applied activity directly dependent on the availability of federal funds. Because health services research will play an increasingly more significant role in the federal effort to provide quality health care at a reasonable cost, the Committee believes that such research training represents an important national priority.

Extension of NRSA Authority

Throughout its effort to conduct an assessment of health services research personnel, the Committee has had to expand its considerations to include important training programs other than those of the NIH and ADAMHA. In last year's report, for example, the Committee called for the maintenance of the research training programs in the NCHSR. The Committee notes that the NCHSR has once again failed to receive funding to continue its once-active research training effort.

Because the Committee is concerned by the instability of federal commitment to the total health services research effort, and because the programs of health services research training provided by the NIH and ADAMHA only supplement but do not supplant the wide range of program areas supported by the NCHSR, the Committee concludes that an extension of the NRSA statutory authority to include the NCHSR is warranted. The inclusion of training through the NCHSR under NRSA will assure the government of the full benefit provided by investment in the training of these personnel.

Recommendation. In order to assure the provision of urgently required training funds, the Committee recommends a statutory amendment of the NRSA Act to include all research training provided by the HRA. Because of the role these personnel play in conducting research relevant to national health care concerns, the Committee recommends that statutory authority be provided at the earliest opportunity through pending legislation, such as the Hospital Cost Containment Act of 1977.

Modification of the Payback Provision

With enactment of the National Health Planning and Resources Development Act of 1974 (PL 93-641), opportunities for effective planning through research and evaluation activities become available nationally. Similarly, other nonprofit entities require evaluation and measurement activities that characterize health services research, such as PSRO's (PL 92-603) and HMO's (PL 93-222). Because trained health services research personnel contribute to these research efforts, the Committee considers subsequent employment in these kinds of organizations appropriate in meeting the NRSA payback requirement. The Committee believes that, properly interpreted, the payback provision requirements specified in the NRSA Act, as amended by the Health Research and Health Services Amendments of 1976 (PL 94-278), includes employment in such nonprofit organizations as long as the employment requires and utilizes the research skills of the trained health services researchers.

Recommendation. The Committee urges the Secretary of HEW to confirm that the NRSA payback provisions permit the employment of health services research personnel in such nonprofit entities as Health Systems Agencies (HSA's), or to seek suitable legislative modification to provide for such employment should he conclude that this interpretation is not permitted by the present law.

Predoctoral/Postdoctoral Training

The Committee concludes that the research training reported by the NIH and ADAMHA within the category of health services research is critical to the mission of each agency and should not be reduced or eliminated.

For a number of years the NIMH has provided training for social scientists in the broad area of evaluation research, focusing on mental health and related services. This program was broadened by ADAMHA in FY 1975 to cover training for a wider variety of services, including alcoholism and drug abuse as well as mental health.

In view of the critical role the ADAMHA programs play in bringing these needed services to the nation, the Committee views the training of personnel to conduct research relevant to mental health services evaluation to require expansion at this time. The Committee approves the growth of the total number of awards for research training in FY 1976 from the level reported in FY 1975.

The Committee recommends that this program of research training, and that of NIH, continue to expand such that the total number of awards supported represents a 10 percent per annum increment from the level reported in FY 1976. This increment should continue at the same rate through FY 1981, such that the total number of awards for health services research training represent 250 in FY 1979 and 300 in FY 1981. In this way, the opportunity for skilled personnel to take up the sophisticated problems of services evaluation in areas of interest to the NIH and ADAMHA will be assured.

The Committee believes that the major health care questions today also require the type of health services research training previously offered through the programs of the NCHSR. The Committee urges, therefore, the complete restoration of this program of training as soon as possible to a level that characterizes its peak year of funding (FY 1972) at approximately 440 awards.

Because of the difficulty involved in making recommendations that will permit the rapid but realistic restoration of a former program of training, the Committee views the numerical recommendations developed this year as approximations that must undergo review in the coming year. Hence, the principal goal that the Committee seeks in making its recommendations this year is the full restoration of research training offered through NCHSR, at a rate to be determined by the administrative officers, but one that will permit the opportunities for new awards to be made available in each succeeding fiscal year.

To permit the entrance of individuals whose current employment experience may be relevant to health services research, the Committee recommends that the bulk of research awards in this area provided by NIH, ADAMHA, and the NCHSR be made at the postdoctoral level.

Because the magnitude of training needs is directly dependent on the availability of federal funds to conduct an active program of health services research, the Committee recommends yearly review of the number of individuals to be trained, with subsequent expansion if research trends indicate such a modification is warranted.

Recommendations. The Committee recommends that the NIH and ADAMHA expand the program of health services research training reported in FY 1976 at a rate of 10 percent per annum through FY 1981 in accordance with the levels suggested in Table 6.3. At the same time, the Committee recommends the rapid restoration of the former program of research training provided by the NCHSR at a level representing its peak year (440 awards). Of the total number of awards, the Committee recommends that up to 55 percent should be made available at the postdoctoral level.

Traineeships/Fellowships

Health services research requires the application of a variety of methods to the problems of health care and health care delivery. As a result the institutional training grant, which permits the development of innovative interdisciplinary research training programs, may be viewed as the preferable mechanism of support in this emerging research area. Indeed, in FY 1976 the number of traineeships provided by NIH and ADAMHA for health services research training surpassed the number of fellowships at a ratio of almost 18 traineeships for every fellowship (see Table 1.1).

The program of research training provided by the NCHSR since FY 1968 represents a similar emphasis on traineeships (NRC, 1976a, Table II.11). While the network of institutional training sites has been weakened in recent years by the absence of funds for continuing these programs of training, it has not been eliminated. In the view of the Committee, however, there is an urgent need to restore support for institutional training capability in order to assure the continuity of support so important to the maintenance of program stability in this area.

The Committee suggests that traineeships be awarded primarily at the predoctoral level, although it may be appropriate in some instances for institutions to mix

TABLE 6.3 Committee Recommendations for NIH and ADAMHA Predoctoral and Postdoctoral Traineeships and Fellowship Awards in Health Services Research

Agency Awards and Committee Recommendations	Fiscal Year 1975	1976	1977	1978	1979	1980	1981
Actual awards							
Total	*183*	*191*[a]					
Pre	*132*	*121*					
Post	*51*	*70*					
1976 recommendations							
Total		185	185[b]	185[b]			
Pre		135	135	135			
Post		50	50	50			
1977 recommendations							
Total					550	715	740
Pre					225	415	430
Post					225	300	310
Total NIH/ADAMHA					250	275	300
Pre					160	175	190
Post					90	100	110
Total HRA (NCHSR)					300	440	440
Pre					165	240	240
Post					135	200	200

[a] FY 1976 awards were reported in 1977 subsequent to the release of the 1976 Report of the Committee. FY 1976 awards reflect an increment in the number of training awards in health services research reported by the NIH.

[b] In this year's report the Committee has amended the recommendations it made last year so that the total number of fellowships and traineeships recommended in FY 1977 is 210 and for FY 1978 is 230.

predoctoral and postdoctoral research traineeships as circumstances dictate. However, predoctoral research training through the institutional training grant works not only to provide the trainee with important interdisciplinary research experience as thesis work is developed, but also to advance health services research through the preparation of skilled personnel who may move on to provide innovative research and research training following the completion of their doctoral work.

The research training fellowship also plays a role, although more limited, in health services research training. The talented investigator who has interest in pursuing a course of health services research training is provided the opportunity to seek such training with a particular leader in this area or at an institution where a critical mass of investigators may be working on the problems that characterize health services research. The Committee views this mechanism of support to be suitable primarily for postdoctoral research training. In this way the fellowship may encourage the individual with some experience in the area of health care policy to take up advanced training.

Recommendations. The Committee recommends that traineeships represent no less than 75 percent of the total number of awards for health services research training. Up to 60 percent of the traineeships should be made available for predoctoral research training at this time. In contrast, up to 60 percent of the individual fellowships should be made available for postdoctoral research training as specified in Table 1.3.

Midcareer Research Training

The Committee notes that health services research personnel evidence many of the same characteristics of those in other newly emerging areas of inquiry. Health services research personnel today primarily represent individuals who have been trained in a basic field or profession and who now occupy positions in health service research by virtue of their career paths, together with those whose interest in health services research led them to seek formal research training. Hence, a program of "mid-career" research training in health services research might provide an important opportunity for number of individuals with similar interests in formal training.

Midcareer research training could attract physicians with experiences as providers in the health care system, academic doctorates whose research interests have shifted to questions of health care, and nondoctorates who desire the acquisition of research skills through formal training that emphasizes advanced techniques and methods in health services research. The Committee recommends that the establishment of a midcareer research training program on a trial basis would provide opportunities for individuals whose employment experiences qualifies them for advanced training in health services research.

Recommendation. The Committee recommends that up to 50 percent of the fellowship funds be set aside to provide for the training of midcareer investigators in the methods of health services research at stipend levels commensurate with their level of career development.

Priority Fields

Health services research personnel are drawn from a variety of academic disciplines and professional backgrounds to work on the problems of health care delivery. Each of these fields contributes uniquely to the solution of the complex questions that face the health planner today.

The Committee has concluded that it would be inappropriate to single out particular disciplines for research training at this time. Instead, the Committee believes that the professional community will determine the appropriate mix of disciplines and levels of training as research training proposals are developed for training in this area.

FOOTNOTES

1. This definition was developed for the Survey of Health Services Research Personnel and is based in part on the definition found in the President's Science Advisory Committee (PSAC, 1972).

2. In 1955 the Congress appropriated funds to implement the demonstration authority of the Hospital Survey and Construction Act of 1946.

3. For a fuller treatment of the impediments to the conduct of health services research, see PSAC (1972).

4. See The Partnership for Health Amendments (PL 90-174) for a specification of this authority.

5. In 1974 the National Center for Health Services Research and Development (NCHSRD) was renamed the National Center for Health Services Research (NCHSR). Either acronym will be used in the text to correspond with its use historically. Further, the term "Center" will be used throughout to refer to this federal unit.

6. These R and D activities were designed to fit together in the same community as an "Experimental Health Services Delivery System" (EHSDS).

7. This list of problem areas has been developed by the Panel on Health Services Research as part of its effort to survey the current employment situation for health services research personnel (see Supplement 6).

8. A limited number of research training awards were provided through programs of research and training consolidated into the NCHSRD in 1968. For purposes of analysis, the individuals in training in FY 1970 and beyond were utilized in the survey of health services research personnel.

9. The Social Sciences Division of the NIMH has provided research training in evaluation methods through such disciplines as sociology and social psychology. However, not all research trainees directed their training to services evaluation as it is defined in this report. As a result, the Committee limited its investigations this year to the specific program of services evaluation training initiated under the aegis of NRSA support in FY 1975.

10. Individuals were selected only if they completed doctoral training through the qualifying exams and emerged with a doctorate or an "all but dissertation" (ABD), or took postdoctoral training. Individuals were eliminated from

this survey if they had only incomplete support and failed to complete their qualifying doctoral examinations.

11. Although the NCHSR was established in FY 1968, programs of research support were continued from the various bureaus and divisions which were combined to form the NCHSR.

12. The author index maintained by Dr. Gerald Perkoff of the Washington University School of Medicine, St. Louis, Missouri, served as the bibliographic source for this sample. Only names with adequate addresses were drawn from this source, and from that of the NCHSR.

13. Of course, some of these individuals are leaders in the area of health services research since it is their experience and familiarity with the problems of health care delivery that established this area of enquiry.

7. NURSING RESEARCH

With the enactment of the Health Research and Health Services Amendments of 1976 (PL 94-278), NRSA training authority was extended to include for the first time the research training programs administered by the HRA Division of Nursing. In contrast to the basic science training support available to nurses through the NRSA programs of NIH or ADAMHA,[1] the programs of the Division of Nursing are intended explicitly to prepare the nurse "to conduct scientific inquiry in disciplines that have relevance in nursing theory and practice" (Appendix N4).

Research training support has been provided to nurses since 1955 through special fellowships awarded by the NIH under the general research authorities of the Public Health Service Act. Between 1955 and 1974, a total of 589 nurses received predoctoral fellowship support for varying periods of time. In that period, 330 completed requirements for doctoral training in such fields as education (95 nurses), educational psychology (17), educational administration (9), behavioral sciences (89), biological sciences (21), epidemiology (13), and statistics (3) (Bourgeois, 1975).

In 1962 these research training opportunities were expanded to include an institutional training grant program that provided stipends to nurses to take up doctoral research training in a variety of areas. Training funds provided institutional support at the same time to basic science departments in such fields as anthropology, sociology, microbiology, anatomy, operations research, and clinical nursing (Matarazzo, 1971). Table 7.1 shows the number of traineeships awarded since 1968 through these institutional training grants, as well as the number of fellowships provided during that period.

Until July 1963, responsibility for research training was shared jointly by the Division of Nursing and the NIGMS in the NIH. After that time, full responsibility for such training was given to the Division of Nursing, currently designated a component of the Bureau of Health Manpower in the HRA (Bourgeois, 1975).

In recent years the the Division of Nursing has had neither research funds nor legislative authority for research training, with the result that the overall size of research training programs has been reduced (see Table 7.1). This situation was exacerbated in part by the fact that the

TABLE 7.1 Number of Full-time Equivalent Traineeships and Fellowships in Nursing Research Awarded by the HRA Division of Nursing: FY 1968-77[a]

	Fiscal Year									
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977 (est)
TOTAL	170	210	217	260	213	208	149	109	35	115
Trainee	62	71	83	88	95	91	64	61	23	13
Fellow	108	139	134	172	118	117	85	48	12	102

[a] Unpublished data provided by HRA Division of Nursing, May, 1977.

Division was not included in the NRSA legislation of 1974 (which restricted research training support to the programs of the NIH and ADAMHA). However, with the availability of NRSA funds this year, significant increases in the number of awards have been achieved in FY 1977, thus revitalizing this program of research training.

Two decades have elapsed since the first fellowship awards were made by NIH in nursing research. During that time a number of significant changes have taken place in nursing research that bear on the future direction of training under the auspices of the NRSA program.

The nursing profession has greatly intensified its commitment to research relevant to nursing practice and patient care (Schlotfeldt, 1975). This is evident not only in the proliferation of research by nurses on problems encountered in nursing practice (Gortner, 1975), but also in the rapid increment in recent years in the number of nurses seeking doctoral training in areas relevant to nursing care (Leininger, 1976).

In the sections that follow the Committee has sought to address: (1) the current trends in nursing research that bear on the future course of research training provided through the programs of the Division of Nursing, (2) the changing status of doctoral training for nurses, and (3) the factors of supply and demand that influence the future growth of research training in this area.

THE NATURE OF NURSING RESEARCH

Nursing research focuses on the role of nursing care in the prevention of illness, care of the sick, and the promotion and restoration of health. Although it relies upon and utilizes the substantive scientific information and methodology provided by the other biological and behavioral sciences, it differs from those other scientific areas in that it focuses on their relevance to nursing rather than other aspects of health care.

By tradition, natural inclination, and previous training, nurses have a special interest in and potential competence for research in this area and it is natural that they should wish to play a part in its advancement. Nurses view health problems differently and direct the results of their research to quite different audiences than other biomedical and behavioral scientists. Hence, nursing research is usually done by nurses. The Committee therefore concurs that nursing research is properly regarded today as a distinct area of scientific inquiry.

CURRENT TRENDS IN NURSING RESEARCH

To understand the history that has led to nursing research as it is conducted today, one must begin with the important role played by Florence Nightingale, "a person who not only held broad concepts about nursing and the role of the nurse, but who also exemplified the research approach (in nursing)" (Gortner and Nahm, 1977). It was she who sought to learn "what factors were related to varying recovery (of patients), morbidity and mortality rates...(and who) clearly communicated over a century ago the need for measuring outcomes of both medical and nursing care" (Schlotfeldt, 1975).

Following the proliferation of state requirements for the licensure of nurses at the beginning of this century,[2] a need developed for the systematic assessment of the general procedures used by nurses in patient care (Gortner and Nahm, 1977). This is evident in the literature of nursing care which was dominated largely by descriptive studies during the 1930's and 1940's. It was federal interest in nursing practice after World War II that further stimulated research focusing on specific clinical skills.[3] By the 1950's, assessments were forthcoming on the role of the nurse in psychiatric services, pediatric care, maternal and child health care, and maternity care (Nahm, 1957).

The case study method contributed to a shift away from a primary concern with professional procedures to an interest in the role of the patient in nursing care (Mauksch and Mauksch, 1950). Soon nursing research expanded to include studies on the psychological, social, and physiological phenomena that affect the individual's approach to health or ability to cope with threats to well-being, as treated by the nurse (Schlotfeldt, 1972). This new research emphasis was given impetus in 1952 with the appearance of a journal entitled Nursing Research. This journal solicited studies on such topics as child care during hospitalization and the effects of unrestricted versus restricted visiting on patient recovery.

In 1960, the American Nurses' Association established a list of priorities for nursing research that reflected these new emphases. This list included the effects of the performance of nursing acts on patient care, nursing needs of patients, and nursing in different categories of illness, such as that which requires surgical care (e.g., Blake, 1962).

As nursing research grew from a concern with the organization and practice of nursing to a broader treatment of the general impairments that accompany health problems, such as pain, anxiety, and suffering and the specific needs of patients and potential users of the health care system (Gortner, Bloch, and Phillips, 1976), the availability of federal support played a major role in the development of nursing research as an area of scientific inquiry. As early as 1958, the Division of Nursing awarded Faculty Research Development grants to schools of nursing to fund the acquisition of needed research equipment and to support research faculty.

In 1966, this program phased out, and in its place a program of institutional research support was initiated, since it was felt that "many of the original goals of the early faculty development had been achieved" (Gortner, 1973). However, the pressures for highly qualified faculty and clinicians in recent years have led to separate authority for advanced nursing training under the Nurse Training Act of 1975 (PL 94-63),[4] to "plan, develop and operate; significantly expand or maintain existing" graduate programs in nursing.

In addition to faculty support, other extramural research grants and fellowships have fostered the expansion of nursing research (Figure 7.1 and Gortner, 1976). In FY 1977, research support through the Division of Nursing will peak at $5 million, with an additional $1 million available for research training.[5]

In testimony before the U.S. House of Representatives Subcommittee on Public Health and Environment in 1975, a representative of the American Nurses' Association identified four problem areas as high priorities for nursing investigators today (Cleland, 1975), many of which are shared by investigators from other fields. These areas demonstrate the continued expansion of nursing research:

(1) studies to reduce complications of hospitalization and surgery (sleep

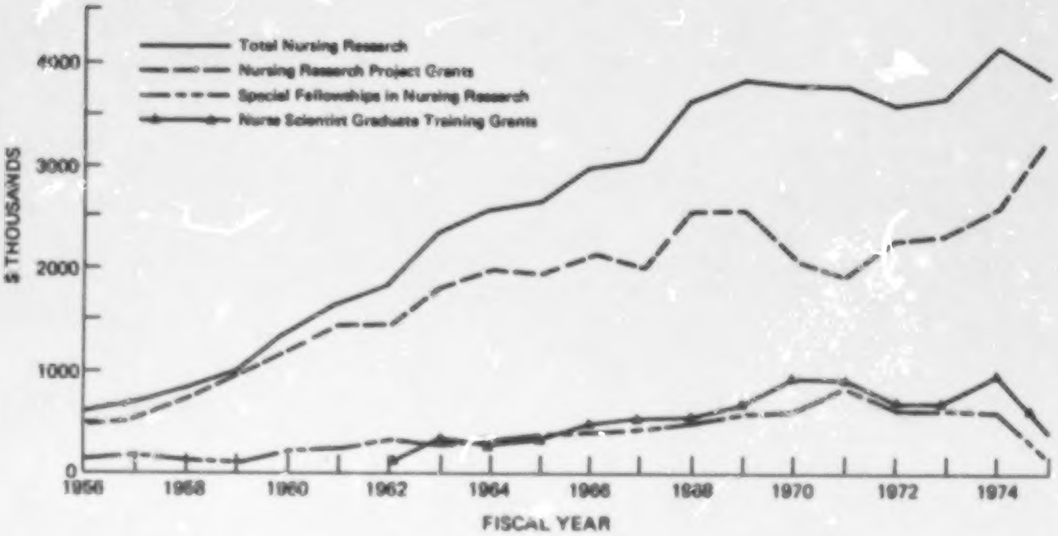

FIGURE 7.1 Total annual expenditure for extramural nursing research and research training, FY 1956-75. From HRA (1976).

deprivation, anorexia, neurosensory imbalances, etc.);

(2) studies to improve the outlook for high-risk parents and high-risk infants;

(3) studies to improve the health care of the elderly; and

(4) studies of life-threatening situations, anxiety, pain, and stress.

In a statement before the President's Panel on Biomedical Research in the same year, a number of other areas were added to this list of priorities (Jacox and Walike, 1975):

(1) studies of adaptation to chronic illness and the development of self-care systems;

(2) studies to facilitate the successful utilization of new technological development in patient care; and

(3) studies of effective intervention in community mental health settings.

It is clear that nursing research today reflects the role of nursing care in addressing questions that arise from the treatment of disease, the prevention of illness, and the maintenance of health (American Nurses' Association, 1976).

With federal research funds directed to schools of nursing, and a renewed interest in providing federal monies for faculty development, research by nurses has become firmly established in schools of nursing. There has been a significant expansion in the number of nurses seeking doctorates in basic science departments outside schools of nursing in recent years, and also an increase in the number seeking doctoral training in nursing research, as it is now beginning to be provided through schools of nursing.

DOCTORAL TRAINING IN NURSING RESEARCH

In contrast to the medical or dental professions, in which a doctorate is conferred on the individual completing professional training, the baccalaureate in nursing is usually the highest academic degree awarded to the nurse to complete professional training.

There are over 1 million registered nurses in the United States today with professional nurse training (American Nurses' Association, 1976). While the first basic programs in nursing leading to a baccalaureate were established in

1909 (Blauch, 1955), it was not until the 1950's that an expansion in the number of institutions offering baccalaureate training was evident (Matarazzo, 1971). Today there are over 1,400 programs in the United States offering professional training in nursing. Of these 1,400 programs, more than 350 offer a nursing diploma after training at a hospital, about 640 offer an associate of arts degree after course work in a community or junior college, and about 340 offer a baccalaureate or higher degree. In addition there are 100 nursing programs that offer a masters degree to students who are registered nurses and 16 that offer the doctorate (National League for Nursing, 1976).

As efforts were made to enhance the quality of nursing care through advanced education, it was apparent that there was a critical shortage of doctorally trained nurses to provide the necessary leadership in schools of nursing through research and teaching (Leininger, 1974). Even today there are less than 2,000 registered nurses who have completed doctoral education, scarcely more than an average of one doctorally trained nurse for each school of nursing in the United States (Jacox and Hansen, 1976).

Indeed, the first Ph.D. awarded to a nurse was in the field of psychology and counseling in 1927 (Matarazzo, 1971). In 1973 it was estimated that, of the 1,020 nurse doctorates who completed their advanced training between 1927 and 1973, 507 held Ph.D.'s in a variety of basic sciences and nursing, 417 held Ed.D.'s, and 39 held doctorates in a variety of other fields including medicine and law (Pitel and Vian, 1975).

Today there is little consensus as to the appropriate doctoral training for the nurse (Schlotfeldt, 1971), but five options may be said to be generally available: (1) doctoral training in nursing denoting preparation in areas emphasizing clinical skills (D.N., D.N.S., D.N.Ed., DPHN), (2) a Ph.D. in nursing with a minor in a basic science field related to nursing, (3) a Ph.D. in science with a minor in nursing, (4) a Ph.D. in a science relevant to nursing with no concurrent training in nursing, and (5) a professional doctorate in such fields as education (Ed.D.).

Despite the variety of options available to the nurse seeking advanced doctoral training, the majority of nurses with doctorates have completed their training in non-nursing areas, such as education or the basic biological or behavioral sciences.

Hence, there is a growing trend within the profession of nursing to upgrade the type and number of doctoral programs in schools of nursing (Ph.D. in nursing) that would assure doctoral-level training on problems of direct interest to nursing research (Leininger, 1977). For example, while there were 14 doctoral degree programs in nursing in 1976, it is expected that this will increase to over 20 new or modified programs by 1981 (Leininger, 1976).

The changing status of doctoral training in the profession of nursing has implications for the future course of research training through the NRSA programs administered by the Division of Nursing. Both the special research fellowship program, which was initiated in 1955, and the research training grant program, which originated in 1962, must be redirected to take into account the growth of nursing research as a distinct area of scientific enquiry and its recent growth in programs of training in schools of nursing. The Committee will treat the implications of these trends more fully in the section on recommendations for future NRSA development.

ASSESSMENT OF THE LABOR FORCE

The rapidly growing interest in doctoral training among nurses is evident in the fact that nearly one-third of nurses who hold doctorates completed their training between 1971 and 1975.

In the face of this rapid expansion in the number of doctorally trained nurses, the Committee sought to assess the extent to which the market has been able to absorb these emerging doctorates. Focusing on recent doctorates, the survey instrument that had been designed to assess the market for biomedical and behavioral science doctorates (see Chapter 3 and 4, and Supplement 6) was sent to the 551 nurses who earned doctoral degrees between 1971 and 1975. About 78 percent of these nurses responded to the survey.

Responses from this group indicated that nurses with recent doctorates have had no difficulty in finding positions in academia. In fact, the unemployment rates and other factors revealed that the employment opportunities for nurses were better than the opportunities for other biomedical and behavioral scientists:

- An average of only 0.5 percent of the nurses' time since earning a doctorate has been spent in search of a job (Appendix I 2).

- Almost 95 percent of these graduates held full-time positions, while only 1.5 were seeking employment in October 1976 (Appendix I 3).

- All but 3 percent of the nurses in the labor force held positions for which they considered their doctoral training relevant (Appendix I 10).

- More than 90 percent of the nurses were employed in educational institutions; the largest number of these worked in nursing schools, two-year colleges, or universities (Appendix I 4).

- An average of 70 percent of the nurses' time was spent in teaching and administrative activities, with only 13 percent devoted to research (Appendix I 5).

- More than three-fourths of the nurses were currently engaged in some research activity, and 95 percent of those employed full-time considered their predoctoral research experience useful to their present responsibilities (Appendix I 9).

As might be expected, almost all of those doing research considered their work directly or indirectly related to health (Appendix I 6). About one-third of all these researchers, and 41 percent of those who had received HRA predoctoral training support, were being funded by federal research grants and contracts, but none of the respondent nurses held postdoctoral appointments at the time of the survey.

In contrast with other biomedical and behavioral scientists, doctoral nurses received more federal training support in the first two years of graduate school than in later years (Appendixes I 11.1 and 11.2). Although 41 percent of the nurses relied on federal training funds as their primary source of support in their fourth year of graduate school, an almost equal number relied on personal resources. Approximately 60 percent of those who had received any federal support while in graduate school indicated that without such support they would not have been able to finish their doctoral program (Appendix I 12). However, only 30 percent of the nurses felt that the availability of financial assistance had influenced their selection of a doctoral field (Appendix I 13).

In summary, these findings suggest that opportunities for the employment of doctorally trained nurses are very favorable at this time.

OUTLOOK FOR THE LABOR MARKET IN NURSING RESEARCH

There is an uneven distribution of nurse-doctorates among schools of nursing today. Indeed, it has been estimated that nurse faculty varies from one faculty member with a doctorate at some schools to 28 in other schools of nursing as of February 1974 (Leininger, 1976).

In its 1977 report, the Western Interstate Commission for Higher Education (WICHE) projected a large need for doctorally prepared nurse faculty in future years, as indicated in the findings from a survey of a number of schools of nursing in the western portion of the United States in 1976 (WICHE, 1977). These findings have been corroborated by a similar study by the Committee on Institutional Cooperation (CIC) throughout a 13-state Midwest Region in 1976 (CIC, 1976). Beyond the need for doctorally prepared faculty with a specialty in clinical practice, these studies have shown an interest among schools of nursing in faculty with research skills. Indeed, this interest in advanced training in nursing research as a specialty area has been reflected in the number of conferences convened in recent years to address the doctoral training of nurses and the avenues by which such training may best be achieved (e.g. Schlotfeldt,1971; Lamberston, 1976).

Current information suggests that the market for doctorally trained nurses is essentially quite large at this time, and that it may be expected to expand as the press of doctoral enrollments in schools of nursing requires the expansion of suitable research and teaching faculty (Leininger, 1976).

Rather than attempting to estimate specific numbers of skilled nurses-doctorates needed to meet this growing demand, the Committee has elected in its present report simply to provide general advice on the direction that the Division of Nursing should take in setting the level of NRSA awards appropriate to meet this need in the next few years. It is anticipated that further data collection in the coming year will facilitate the development of estimates to clearly understand the rate of expansion in the market for doctorally trained nurses and its relation to future training needs.

NURSE TRAINING FUNDED BY NIH AND ADAMHA

The Committee recognizes that a number of nurses have completed doctoral and postdoctoral work in basic science fields. In this chapter the Committee wishes to deal only with training for nursing research and neither discusses nor makes recommendations for nurses who wish to reorient their careers as basic biomedical or behavioral scientists.

The Committee is aware that NIH and ADAMHA support the training of nurses in basic science fields. This is a desirable development, but it does not fall within the category of nursing research as defined in this report. Accordingly, research training for nurses funded by NIH or ADAMHA is included within the recommendations of the Committee for the other basic science fields covered by this report.

RECOMMENDATIONS

The Committee believes that it is important that the leaders and teachers in the nursing profession be in a position to contribute to the advancement of knowledge in fields related to nursing.

The optimum institutional arrangements for fostering research training in the area of "caring" for the patient are not yet entirely clear. Several leading schools of nursing are eager to develop qualified graduate programs. In most cases these should probably be related to other departments in the university that are prepared to offer basic training in other fields of biomedical and behavioral sciences. Whether the overall supervision of such programs should be administered by the nursing school itself or the school of graduate studies that includes the other affiliated basic science departments is an administrative detail that will undoubtedly vary from institution to institution.

While this experimentation with appropriate curricula and administrative arrangements is proceeding, the Committee believes that government agencies should adopt a sympathetic and encouraging attitude and be prepared to provide funding either in the form of research training fellowships or carefully designed research training grants as fully qualified graduate programs in schools of nursing become identified.

The situation is rapidly changing, and the Committee thus regards any quantitative suggestion it may make at this time as tentative and subject to modification on an annual basis. However, the obvious demand for teachers and researchers with graduate training in nursing research makes it likely that training funds could be productively used for the next several years on an expanding basis.

The Committee recognizes that there is often no clear line of demarcation between nursing research and other areas of biomedical and behavioral research. Some flexibility in classification of particular projects by the Division of Nursing is therefore necessary to implement the following Committee recommendations.

Predoctoral/Postdoctoral Training

There is evidence of rapid expansion in graduate enrollments in schools of nursing today, and a real need to strengthen faculty through an increase in doctorally trained nurses capable of providing necessary leadership through research and teaching. As NRSA authority has been extended to the Division of Nursing, it is clear that predoctoral training continues to be the appropriate level for research training emphasis at this time.

However, the Committee is also aware that nursing research as an area of inquiry can advance if support for postdoctoral training is also provided, particularly for those nurses who have completed their doctoral training in prior years and now wish to update their research skills.

As a result, the Committee suggests that a small proportion of both traineeships and fellowships be made available for postdoctoral research training in the coming years and that this proportion increase at the rate prescribed below.

Recommendation. The Committee recommends that, as properly qualified candidates present themselves, up to 15 percent of the total number of research training awards made available through the Division of Nursing in FY 1979 be made at the postdoctoral level. The Committee recommends that this proportion be increased as evidence suggests such an increment to be appropriate (see Table 7.2). The Committee intends these levels only as guidelines and recognizes that there may not be a sufficient number of well-qualified applicants for postdoctoral training in nursing research to take advantage of this opportunity in the near future.

TABLE 7.2 Recommended Distribution of Predoctoral and Postdoctoral Awards for Training in Nursing Research: FY 1979, 1980, and 1981

	Fiscal Year		
Level of Training	1979	1980	1981
TOTAL	225	240	270
Predoctoral	193	190	205
Postdoctoral	32	50	65

Traineeships

As in other emerging areas of scientific inquiry, the training grant plays an important role in nursing research by bringing the theory and methods of the basic sciences to the problems of nursing care.

Training grants may be given to schools of nursing to establish interdisciplinary programs for nurses in cooperation with university departments of basic science. In this situation traineeships are given to nurses to study toward doctoral degrees in nursing and in the biological, physical, or behavioral sciences.

With the growth of a distinct body of knowledge in nursing research it is also possible at this time to place a limited number of training grants in well-qualified schools of nursing for the purpose of providing training in this area. The traineeship is given to the nurse to take up research training in a graduate department of nursing.

The Committee is cognizant of the need to stimulate nursing research and the production of adequately trained nurse-doctorates at this time through the training grant. At the same time, owing to the scope of training provided through this mechanism by the Division of Nursing today, the Committee is aware of the need to proceed gradually as this program is put into place, in a manner that will assure the provision of awards to graduate departments that are ready to provide training in nursing research comparable in quality to training provided for Ph.D.'s in other areas.

As a result, the Committee has been able only to suggest through its recommendations this year the direction of growth sought through this program of traineeship awards. It is the Committee's intention to review these recommendations in the coming year in light of additional data that will be made available to the Committee by the Division of Nursing, and to make whatever adjustments that are useful to foster training through this program of awards.

Recommendation: The Committee recommends that the program of institutional grant support for research training provided by the HRA Division of Nursing be expanded to meet the needs for investigators in nursing research. In view of the limited program of support in FY 1977, the Committee recommends that the program be expanded gradually to a total of 95 traineeship awards in FY 1981 (see Table 7.3). In addition to providing awards for training in basic science departments affiliated with nursing schools, the Committee also recommends that a limited number of awards be provided for research training in graduate departments of well-qualified schools of nursing in the area of nursing research. The Committee will review its recommendations in

TABLE 7.3 Recommended Distribution of Traineeships in Nursing Research by Institutional Setting: FY 1979, 1980, and 1981

Research Training Site	Fiscal Year 1979	 1980	 1981
TOTAL	50	65	95
Grad. depts. of nursing[a]	10	15	20
Nonnursing depts.[b]	40	50	75

[a] "Grad. depts. of nursing" refers to research traineeships made available to nurses through institutional training grants put into graduate departments in schools of nursing.

[b] "Nonnursing depts." refers to research traineeships made available to nurses through institutional training grants administered jointly by graduate departments in schools of nursing and departments of basic science outside the schools of nursing, providing a "dual track" program of training for the nurse scientist.

the coming year to determine whether further adjustments are necessary either in the total number of awards recommended or in allocation by training site.

Fellowships

Nurses have had fellowships in the past for doctoral training in the biological and behavioral sciences, as well as for training in such fields as education, educational administration, and public health administration. It is the belief of the Committee that research training in areas relevant to the enhancement of nursing education, administration, and curriculum development is appropriate under the auspices of NRSA support. However, the Committee would like to stress that training emphasis in nonscience areas should be on research and not on professional training, since it is research training that will advance research on nursing care.

In view of the need to increase the number of doctorally trained nurses in the area of nursing research, the Committee views as an important first step the reorientation of the fellowship program under the auspices of NRSA support.

The Committee recommends a substantial reduction in fellowship support in nonscience departments outside the schools of nursing, and, in view of the growing capability among well-qualified schools of nursing to take up research training at this time, the Committee recommends that a limited number of awards be used for training in schools of nursing as well as in other parts of the university interested in the problems of nursing care. This reorientation, furthermore, should be accomplished through the maintenance of the total number of awards through FY 1981.

Recommendation: The Committee recommends that a significant reorientation take place in the fellowship award program while maintaining the program at a total comparable to the estimated number of awards in FY 1978 (175 awards). The Committee recommends a substantial reduction in the number of awards for research training in nonscience departments. The Committee also recommends a shift in training emphasis to provide research training opportunities to nurses in well-qualified graduate departments both within schools of nursing and in other departments interested in the problems of nursing care. In this way research training through the fellowship mechanism will assure the advancement of nursing research. In view of the impact of this proposed reorientation, the Committee will review its recommendations

TABLE 7.4 Recommended Distribution of Fellowships in Nursing Research by Institutional Setting: FY 1979, 1980, and 1981

Research Training Site	Fiscal Year		
	1979	1980	1981
TOTAL	175	175	175
Grad. depts. of nursing[a]	50	75	100
Nonnursing depts. total[b]	125	100	75
Basic science depts.	75	75	75
Nonscience depts.	50	25	0

[a] "Grad. depts. of nursing" refers to research fellowships made available to nurses for research training in schools of nursing.

[b] "Nonnursing depts." refers to research fellowships made available to nurses to take up training either in basic science departments outside schools of nursing (basic science depts.) or in such professional/applied schools as schools of education or schools of business administration (nonscience depts.)

TABLE 7.5 Recommended Distribution of Predoctoral and Postdoctoral Traineeships and Fellowships for Training in Nursing Research: FY 1979, 1980, and 1981

Fiscal Year		Traineeships	Fellowships	Total
1979	Total	50	175	225
	Pre	43	150	193
	Post	7	25	32
1980	Total	65	175	240
	Pre	50	140	190
	Post	15	35	50
1981	Total	95	175	270
	Pre	70	135	205
	Post	25	40	65

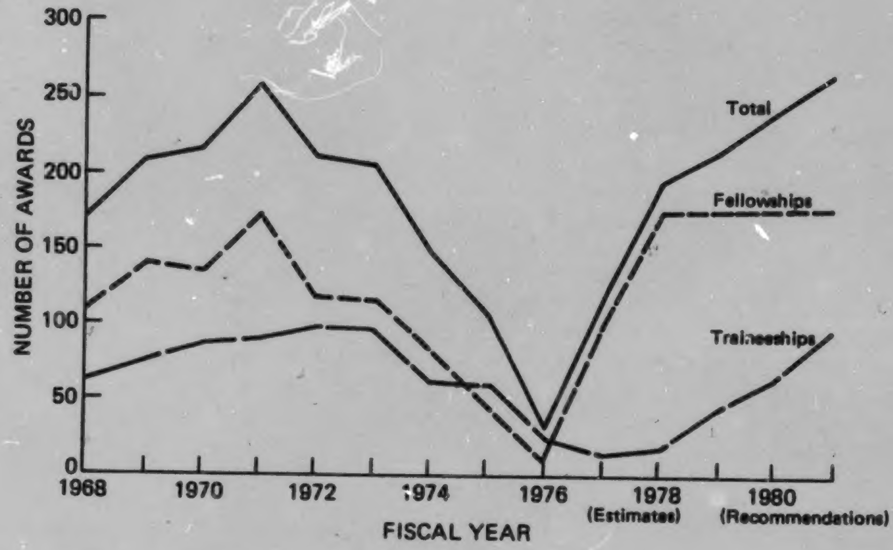

FIGURE 7.2 Distribution of traineeships and fellowships for training in nursing research including Committee's recommended levels for FY 1979, 1980, and 1981.

in the coming year to determine whether further adjustments are necessary, either in the total number of awards recommended or in the allocation by type of training site (Table 7.4).

Summary

The Committee's recommendation is made in light of the knowledge that institutional support has been forthcoming from the Advance Nurse Training Programs of the Nurse Training Act of 1975 (PL 94-63). The research training grants available under the NRSA Act will not duplicate the quite different grants now available under the new authority of the Nurse Training Act, which is directed toward advanced professional training for nurses rather than for research training.

In recommending a maintenance of the total number of fellowship awards through FY 1981, the Committee is cognizant that a growing interest in advanced training within the professional sector may require, ultimately, and expansion of this program. However, the Committee at this time has not had available to it the information necessary to determine any further growth of this program. Instead, the Committee views as an important and necessary first step, the reorientation of emphasis in training away from nonnursing professional fields toward direct experience in nursing research as provided by schools of nursing and in basic science departments relevant to nursing research. Table 7.5 specifies the distribution of these awards for traineeships and fellowships. Specifically, up to 15 percent of the total number of traineeships and up to 15 percent of the total number of fellowships recommended for FY 1979 should be made available at the postdoctoral level. Similarly, up to 20 percent of the traineeships and up to 20 percent of the fellowships in FY 1980 should be for postdoctoral training, and up to 25 percent in each category in FY 1981, should evidence accrue suggesting that such an expansion is possible.

As recommended by this Committee, the future direction of research training provided through the programs administered by the HRA Division of Nursing would be that shown in Figure 7.2.

FOOTNOTES

1. Nurse investigators are eligible for NRSA support through ADAMHA in basic biomedical or behavioral sciences or in health services research.

2. The designation "registered nurse" dates to the passage of the Nurse Practice Act in 1903 in North Carolina. It was not until 1923 that all states required such licensure.

3. In 1948, the Surgeon General of the PHS established the Division of Nursing Resources to determine the supply and distribution of nurses in the United States, the quality and costs of education, job satisfaction, and patient satisfaction with nursing care.

4. The Nurse Training Act of 1975 [Section 821 (a)(1)] specifies that: "The Secretary may make grants to and enter into contracts with public and nonprofit collegiate Schools of Nursing to meet the costs of projects to (A) plan, develop, and operate, (B) significantly expand, or (C) maintain existing programs for the advanced training of professional nurses...."

5. Private communication, HRA Division of Nursing, May 1977.

8. MINORITIES AND WOMEN

At its public meeting, the Committee was asked by several participants to consider problems encountered by minorities and women in pursuing graduate training and employment in the biomedical and behavioral sciences. For its analyses the Committee relied on data from its own survey of recent graduates in these areas and from another NRC survey of doctorate recipients. Findings from these surveys were compared to results from a more detailed study of minorities and women in all areas of learning (NRC, in press) in order to provide a perspective.

MINORITIES IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES

Members of minority groups[1]--blacks, Chicanos, Puerto Ricans, Asians, and American Indians--while representing approximately 17 percent of the U.S. population, constitute a much smaller proportion of those who obtain research doctorates in this country. This section deals with minority individuals with doctorates in the biomedical and behavioral sciences and indicates some of the factors that may be related to the underrepresentation of these groups in these areas. The discussion and tabulations presented here focus on native-born U.S. citizens. If naturalized and foreign citizens were included, the overall figures on minority representation in the Ph.D. population would be greatly inflated (NRC, 1974, pp. 20-23).

The figures presented are taken from the Survey of Earned Doctorates (NRC, 1973-76), which has included a question on minority status since 1973. Because the numbers for groups other than blacks have always been quite small, the analyses that follow do not attempt to differentiate among the various minorities, except in cases for which the observed differences are especially large. However, the Committee is aware that each minority group may have had a different experience in graduate science education.

Over the last four years there has been a gradual increase in minority representation among doctoral recipients in all areas of learning. In the biomedical sciences there has been a decrease in the percentage of minority scientists. Among native-born U.S. citizens in this area, minority members represented 5.1 percent of 1973 and 1974 Ph.D.'s and 4.2 percent of 1976 doctorate recipients (Appendix J1). In the behavioral sciences, on the other hand, there has been an increase in minority representation. In 1973, 3.9 percent of behavioral science doctorates were awarded to minority group members and in 1976, 5.9 percent (Appendix J1). All groups except Asians participated in this increase to some degree.

The decline in minority representation in the biomedical sciences, despite an increase in the minority percentage of all Ph.D.'s, is partly explained in a tabulation of Ph.D.'s who had received biomedical baccalaureate degrees (Appendix J2). Of whites who had received the B.A. in the biomedical area and subsequently earned doctorates, approximately two-thirds received their advanced degrees in the same area. The percentage was similar for Chicanos and even higher for Asians. For the other minorities, however, the proportion of Ph.D. recipients with biomedical baccalaureates who obtained their Ph.D.'s in the same area was considerably smaller. This was strikingly so among blacks, of whom only 43.7 percent with biomedical B.A.'s had completed the Ph.D. in the same area, while 44.3 percent had obtained doctoral degrees in education. This shift into education has undoubtedly been a major factor in the decline in the black representation among biomedical Ph.D.'s.

A similar pattern prevailed for those doctorate recipients with baccalaureates in the behavioral sciences. Every group except the Puerto Ricans had a smaller proportion than whites of individuals who continued in the same area to complete the doctorate. Again, less than half the black Ph.D. recipients with behavioral science baccalaureates obtained Ph.D.'s in the same area (many held doctorates in education).

These findings may be explained, in part, by the fact that education has traditionally been an area with substantial black representation. It is also an area in which it is possible for individuals to earn a living in their profession while obtaining graduate degrees. This may be a particular concern for many minority members who can less afford the costs associated with graduate education.

In the biomedical sciences, smaller proportions of all minority groups except Asians received their doctorates before the age of 30, compared to whites. In the behavioral sciences, this finding held for all minority groups (Appendix J3). In both areas, approximately one-fifth of the blacks obtained their doctorates at the age of 40 or later. Various factors combined to produce this outcome. In both biomedical and behavioral fields, more minority members than whites started graduate work after the age of 25. This was true for every group except American Indians in the biomedical sciences and Puerto Ricans in the behavioral sciences (Appendix J4). In both areas, substantially smaller proportions of blacks started graduate work before the age of 25 than whites, although no such difference was found among women in the behavioral sciences.

In both the biomedical and behavioral sciences, minority members spent more time away from graduate study than whites. Asians in the biomedical fields were the only exception. Strikingly high percentages of blacks, 28.7 percent in the biomedical sciences and 24.5 percent in the behavioral sciences, spent more than three years away after initiating graduate study (Appendix J5). It was also found that all minority group members except Asians had more dependents at the time they completed the doctorate than did whites (Appendix J6).

These factors may all contribute to the reluctance of minority members to enter postdoctoral study. In fact, Chicanos and Asians in both areas and Puerto Ricans in the behavioral sciences showed higher percentages than whites of Ph.D.'s planning postdoctoral study, but the proportions for the other groups, particularly blacks, were much smaller (Appendixes J7.1 and J7.2). To the extent that in certain areas, particularly in the biomedical sciences, additional training beyond the Ph.D. is required, blacks may have been effectively discouraged from initial entry into graduate education in such an area.

Utilization of training after receipt of the doctorate does not appear to be a problem for minorities at this time. With the exception of American Indians in the behavioral sciences, the percentage of minority individuals with firm employment commitments at the time the degree was awarded was similar to that of whites (Appendix J8). Of those with employment plans, similar proportions of whites and minorities reported these commitments to be in the area of the doctoral degree (Appendix J9). In the biomedical sciences, a slightly higher percentage of minority than white doctorate recipients had such plans, and in the behavioral sciences the proportion was slightly smaller for minority individuals.

The Committee believes that the evidence cited above clearly indicates that additional efforts must be made to provide more opportunities for minorities to enter and to complete without undue delay predoctoral training programs. Hence, the Committee urges that special policies be developed by the funding agencies that are targeted directly to the needs of minorities. Such programs should be in addition to the Minority Access to Research Careers (MARC) and Minority Biomedical Support (MBS) programs of NIH, and the program of ADAMHA that provides training funds to selected national professional societies, which in turn award fellowships to minorities in the behavioral sciences.

Recommendations. In order to encourage more minority applicants to enter and complete graduate training without undue delay, the Committee recommends that: (1) ADAMHA provide predoctoral support for minorities starting with the first year of graduate training (instead of the third year under current policy), and (2) special effort be made by each agency to encourage qualified minority applicants to undertake postdoctoral training by establishing a special postdoctoral fellowship program targeted to minorities.

WOMEN IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES

Representation of women among U.S. doctorate recipients has changed dramatically over the last decade. The proportion of women receiving doctorates has doubled during this time,[2] going from 11.6 percent in 1966 (NRC, 1976-77, 1976 report, p. 4) to 23.3 percent in 1976 (NRC, 1976-77, 1977 report, p. 4). Women now comprise 23.3 percent of the doctorate recipients in the biomedical sciences and 33.4 percent in the behavioral sciences (Appendix J1). These changes have occurred during a time in which many barriers to graduate study for women have disappeared. This trend was illustrated by findings from the Committee's survey of recent Ph.D.'s, which showed only small differences between the number of men and women with graduate training support by traineeships/fellowships and research grants (Appendixes B18.1, B18.2, E16.1, and E16.2).

Nevertheless, to some extent the graduate training patterns of women still differ from those of men. Numerous studies have pointed out that, while the median age at completion of the degree is similar for both sexes, there is a broader range for women (Astin, 1969; Carnegie Commission on Higher Education, 1973; Centra, 1974). This proved to be the case for recent degree recipients in the biomedical and behavioral sciences, as shown by the data from the Survey of Earned Doctorates. That survey showed that similar proportions of men and women completed the doctorate degree before the age of 30, but women represented a smaller proportion of the 30 to 39 age-group and a larger proportion of the over-40 group (Appendix J3). One factor in this difference is the finding that women are more likely to begin graduate training after the age of 35 (Appendix J4) and, as a group, women take more time out from graduate work after they have enrolled. This pattern is more distinctive in the biomedical than the behavioral sciences (Appendix J5). Such results have led a number of observers to suggest that special considerations in admission be given to older women and that part-time study arrangements be made for women who have acquired dependents before undertaking graduate work.

In addition to such issues in graduate training, it is clear that women are likely to encounter greater problems in the utilization of their training. According to the

Committee's survey of recent doctorate recipients, women were less likely than men to find the overall Ph.D. training relevant to their present employment situation (Appendixes B9 and E9). This evaluation is more an accurate reflection of the general employment situation of women than of their recent training experience. Following receipt of the degree, women with biomedical and behavioral science doctorates spent less time than men in full-time employment and more time than men in part-time work, in seeking employment, and in postdoctoral study (Appendixes B1 and E1.1). The same situation prevailed at the time of the survey in October 1976 (Appendixes E2 and E2.1).

Findings also showed that women were more likely than men to be employed in educational institutions and less likely to work for government (Appendixes B3 and E3.1). They were less likely than men to be engaged in administration or management and, in the behavioral sciences, less likely to spend some time in research (Appendixes B4 and E4.1). In terms of measures of professional success, women still clearly lag behind men. Women were less likely than their male counterparts to have achieved tenure and, in the biomedical sciences, considerably less likely to be in tenure-track positions (Appendixes B12 and E12.1). In every employment sector in both areas and in all age-groups (except among behavioral scientists below the age of 30), women earned less than men (Appendixes J10.1, J10.2, and J10.3).

Many of these differences in the professional utilization of men and women disappeared when data from the Committee's survey of recent Ph.D.'s were analyzed by marital status. Single women in both fields spent as much total time fully employed following receipt of the degree as single men and much more total time than married women (Appendixes J11 and J12). Marital status did not affect the holding of postdoctoral fellowships for women but did for men; single men were much more likely than married men to have held or be holding such appointments. Among women who took postdoctoral appointments soon after the degree, however, married women were much more likely than single women to cite lack of employment as the reason for doing so (Appendix J13).

The data showed that single women were more likely than married ones to be in educational institutions (Appendix J14). This has been the alternative traditionally preferred by professional women, and it may be that single status permits the mobility or bargaining power needed to achieve such positions. In both areas the single women spent a smaller portion of their time in research than married women (Appendix J15). In the academic labor force, single women were more likely than married ones to be in tenure-track positions. However, single scientists of both sexes were less likely than married men to hold such positions (Appendix J16). Married women were less likely to find the overall doctoral experience relevant to their employment situation than either single men or single women. Married men were most likely to find this experience relevant (Appendix J17).

The Committee does not believe that any specific recommendations concerning the support of women under the NRSA program is necessary except for that noted in Chapter 9 concerning payback provisions by women who must interrupt their training because of pregnancy. The Committee does urge that academic departments continue to recognize some of the disparities noted in this report and give greater emphasis to providing teaching and research assistantship opportunities to women in the future.

FOOTNOTES

1. For capsule descriptions of the various minorities, see NRC (in press).

2. Although data on the number of women earning doctorates are available as far back as 1920, figures were reported only for the last 10 years, since this is the period in which the greatest increase has occurred.

9. ADMINISTRATION OF THE NRSA PROGRAM

The highest priorities set by the Committee during the past two years have been to assess overall needs and make specific recommendations concerning levels and mechanisms of support and areas of training requiring special attention. In its 1975 and 1976 reports the Committee has not addressed issues that would require changes in the legislation or, with the exception of announcement fields, in the general administration of the program by the funding agencies. With the maturation of the program, however, the Committee believes it now is appropriate to address some of these issues and to make several specific recommendations, since funding agencies, individuals, and the academic institutions have now had sufficient experience with it.

The Committee notes the complex situation that confronted the agencies in FY 1975 in beginning to administer the new program. With the passage of the NRSA legislation, it became necessary for agencies to meet their commitments to individuals and institutions who had received awards in previous years under a different training authority and two separate sets of policies and guidelines, while simultaneously developing policies and procedures for implementing a third NRSA program of fellowships and training grants. The number of commitments made under the former training authorities are decreasing rapidly, and all will terminate in FY 1979. With the NRSA program now the predominant mechanism for the support of research training, and recognizing that this is the third year in which awards have been made, the Committee offers in the following sections specific recommendations about some general policy issues not addressed to date.

GENERAL POLICY ISSUES AND RECOMMENDATIONS

Three-Year Limitation on Awards and Criteria for Waiver of Limitation

The NRSA Act states that "The period of any National Research Service Award made to any individual...may not exceed three years in the aggregate unless the Secretary for good cause shown waives the application of the three-year limit to such individual." The Act thus places a three-year limit on the time any individual may hold an award and permits the Secretary for good cause to waive that three-year limit.

It is first necessary to interpret whether the three-year limitation applies to all awards made in the lifetime of the individual or whether it permits a three-year award at the predoctoral level and a three-year award at the postdoctoral level. The Committee believes that the latter interpretation is a reasonable reading of the statute, is consistent with its purpose, and is not contrary to its legislative history.

The Committee notes that many individuals at the time they begin predoctoral training are unable to project clearly their plans for a total research training program, particularly as this concerns their future interest in, duration of, and need for federal support during postdoctoral training. The result of this is that some individuals may embark upon a program of predoctoral training utilizing NRSA support without having any clear knowledge of how this utilization of federal support at the predoctoral level may affect their application for further NRSA support, which may be required for a period of postdoctoral training. Others may forego any federal support during predoctoral training for fear that this will jeopardize federal support for postdoctoral training at a later date. This is of particular importance to graduate students in the basic biomedical sciences, for example, where more than 60 percent go on for postdoctoral training.

The Committee believes that a maximum of NRSA support for three years each at the predoctoral and postdoctoral levels for any one individual would provide sufficient flexibility to accommodate the needs of applicants, meet the objectives of the NRSA program, and be consistent with the spirit of the legislation. If this is not achieved by interpretation of the statute, it should be achieved through publication of criteria implementing the waiver provisions of the law.

The available data show that, in contrast to nonminorities, minorities get their degrees at a later age, generally need more financial support, and frequently demonstrate a need for additional formal training to remedy deficiencies in background preparation. The Committee therefore believes that special support provisions are necessary (see recommendation in the section "Minorities," Chapter 8).

With regard to the provision of the Act that permits the Secretary to waive the three-year limitation on awards, and regardless of the decision concerning interpretation of the three-year limit, it is necessary to develop criteria by which requests for waiver can be considered. The PHS in May

1975 issued regulations (Appendix K1) that stated that for the purpose of determining what constitutes "good cause," "the Secretary shall take into account such factors as whether the applicant proposes to complete both predoctoral and postdoctoral training programs under the Award or whether the applicant proposes to pursue a combined program leading to the degrees of doctor of medicine and doctor of philosophy."

Although these regulations do refer generally to some of the relevant factors that the Secretary may take into account in determining waiver of the three-year limitation, the Committee believes that a specific set of criteria should be developed and announced in order that all potential applicants for support under the NRSA program may have complete understanding of the specific factors that will enter into the determination of requests for waiver. The Committee understands from its discussions with agency officials that a majority of the requests for waiver can be expected to be sufficiently well-justified as to result in favorable decisions. Nonetheless the Committee believes that it would be in the best interests of the program if clear criteria were established to determine these matters.

Recommendation. It is recommended that, as soon as possible, the agencies determine the proper interpretation of the three-year limitation in the NRSA Act and establish the specific criteria by which requests for waiver of the three-year limitation will be determined. Applicants whose requests for waiver are disallowed should receive in writing the specific reasons for this decision, and an appropriate procedure should be established whereby an adverse finding may be appealed.

Payback Provisions and Waiver of Payback Requirement

Public Law 93-348 categorizes both the kinds and extent of service acceptable as payback by NRSA recipients in lieu of monetary reimbursement and provides opportunity for the Secretary, upon request, to authorize other types of service activity as acceptable. The Secretary may extend the period for undertaking service provided for payback, permit breaks in service, or extend the period for repayments.

The Committee recognizes the complexities that the agencies face as they implement this part of the Act. It will review carefully and with great interest the regulations that are proposed with regard to the conditions and terms of service that will constitute acceptable payback by recipients of these awards. It is of the utmost importance to the success of the overall program that the procedures and policies that are established (1) be equitable, (2) be administered in a uniform manner within and between funding agencies, and (3) allow for all appropriate types of service that research-trained personnel in these fields may be expected to undertake in utilizing their specialized training in research (see particularly the discussion and recommendation in "Modification of the Payback Provision" in the health services research section of Chapter 6).

Recommendation. The Committee recommends that regulations be promulgated immediately concerning the specific criteria to be applied in determining waiver of payback requirements and that particular note be taken of the special needs of specific classes of NRSA recipients. An example of the latter is provided by women who become pregnant and must interrupt or terminate their training program.

Stipend Levels

The Committee has learned that the Internal Revenue Service (IRS) this year notified the PHS of an opinion that stipends received under the authority of the NRSA Act are considered to be taxable. The Committee views with great concern the practical consequences of this development, because it may serve as a disincentive for applicants to pursue research training under NRSA support, and believes that the IRS should withdraw this opinion. The Committee believes that it is unsound public policy for the government to grant a research stipend and then withdraw part of it through taxation. This amounts to a reduction in the amount of the stipend. The Committee believes that research stipends must be kept sufficiently high to permit awardees to spend full time on their research training programs.

Above and beyond the IRS opinion on the tax status of stipends, the Committee notes that stipend levels have not changed since they were first established in 1974, although the cost of living has increased significantly during this period. The Committee is very much concerned that the gradual but constant erosion of the value of the stipend will severely handicap efforts to attract highly qualified students into the biomedical and behavioral sciences by requiring them to engage in outside employment in order to supplement their incomes. The Committee believes that students engaged in training for careers in biomedical and behavioral science research should not be forced into part-time study, since this is not conducive to timely completion of the rigorous training program in these scientific areas, which is a necessary condition for productive research careers.

The Committee regrets that the stipend level has not been adjusted for cost-of-living increases since 1974 and urges that a mechanism to provide for offsetting the effects of continuing inflation be instituted. This adjustment must be made with additional funding beyond that required by the Committee's recommended levels of trainees and fellows.

Recommendation. The Committee recommends that the Department of HEW request the IRS to withdraw its opinion that NRSA stipends are taxable. Regardless of the outcome of that request, the Committee recommends that Congress make available the required additional funds to implement in FY 1979, or sooner if possible, a cost-of-living increase of no less than 5 percent to all predoctoral and postdoctoral fellows and trainees. The Committee recommends that future legislation provide for an annual cost-of-living increase.

Multidisciplinary Training Grants

In recent years the NIH (specifically the NIGMS) has moved almost entirely to providing support only for multidepartmental training grants rather than supporting training grants in individual departments. The Committee endorses multidisciplinary training in both the biomedical and behavioral sciences, particularly at the predoctoral level. It notes, however, that depending upon the objectives of the proposed program, such training frequently can be accomplished within a single academic department. In other instances inter- or multidepartmental cooperative arrangements are required. The Committee thus emphasizes the importance of distinguishing clearly between multidepartmental grants and the desirability of and its support for multidisciplinary research training.

Administrative practice of the NIH, however, at times has seemed to place undue emphasis on the need for applicants for training grants to develop multidepartmental grants. The Committee concludes that it is therefore best left to the scientific review bodies advisory to the NIH to decide what departmental arrangements best meet the objectives for any particular proposed program of research training.

Recommendation: The Committee supports the concept of multidisciplinary predoctoral training in the biomedical and behavioral sciences. However, it recommends that the NIH not discourage applications from individual departments but accept for review applications for training grants from both individual and multiple departments and allow the peer review process to determine whether the proposed departmental arrangements are those that can best meet the objectives of the particular program under consideration.

Announcement Fields

The information collected by the Committee provides no basis for the designation of narrow fields or topics as priorities for research training, particularly at the predoctoral level. The Committee therefore has concluded that there is no basis at this time for determining under Section 472(a)(3) of the Act that any particular subject matter is not appropriate for funding. Within the broad limits of the biomedical and behavioral sciences, the announcements issued by the NIH and ADAMHA should not be written in a way that results in the exclusion of specific fields or subject matter.

Thus, although the Institutes within the NIH might conclude it is desirable to describe fields of predoctoral training that are of special interest to the particular Institute, it should be made explicit that such description does not confer any special priority advantage upon applicants who apply for support in those specific fields and that all applications for predoctoral support regardless of field will be equally competitive, with quality the determinant of success.

Recommendation. The Committee recommends that NRSA announcements specify that awards will be made solely on the basis of quality and merit and that no field or subject matter that is within the broad limits of the biomedical and behavioral sciences is excluded from consideration.

The Committee also continues to question the validity of the distinctions drawn by the NIH in their announcement of training areas suitable for postdoctoral fellowships as contrasted with postdoctoral training grants. During the year the Committee opened discussion of this issue in written communication to the Director, NIH. It requested that the rationale for such distinctions be provided in writing to the Committee, which would provide a basis for discussions between the Committee and agency officials. The Committee wishes to be informed what fields are intended to be excluded and why. Until these discussions are concluded, the Committee has no further general recommendation to make with regard to announcement areas for postdoctoral training apart from those specified in the present report for the five broad areas.

Acquisition and Dissemination of Employment/ Utilization Information to Individual Applicants and Academic Departments

The Committee believes it to be very important that students contemplating research careers in the biomedical and behavioral sciences be provided access to the most current and valid data about the state of the labor market and career opportunities. The views originally held by some members of the panels and of the Committee concerning the overall marketplace and extent of unemployment and underutilization were modified as the result of reviewing and analyzing the results of its surveys (Chapters 3 and 4).

It is neither desirable nor feasible to conduct annual surveys of the breadth undertaken this year. Nonetheless, the Committee does believe that some brief annual or biennial assessment of the levels and numbers of persons in training, of the employment markets, and of the utilization of skills by graduates is indicated, with the results then made available promptly to interested individuals, university departments, and other organizations concerned with scientific manpower.

Recommendation. The Committee recommends that employment findings from this year's surveys be brought to the attention of academic departments, undergraduate counselors, professional societies, and others concerned with higher education and scientific manpower issues. Publication in a journal having widespread distribution would be one means of effecting rapid communication about changes in career opportunities such as those currently occurring in some of the basic biomedical science fields. It is also recommended that during the coming year the agencies and Committee discuss means whereby the needs and utilization of research manpower can be better ascertained regularly on an annual or biennial basis, with particular interest directed toward obtaining overall information about the increasing population of postdoctorals and nontenured research staffs in academic institutions and, from recent graduates, data on employment and utilization of skills.

10. FUTURE DIRECTIONS

In this year's report the Committee again drew heavily upon existing data, but also obtained new information pertinent to a number of specific issues. The results of these studies are included in part in this report. Other information will be made available during the coming year in the form of technical reports. It is evident that further analysis of recently collected data and extension of the data base as a whole will improve the understanding of career patterns and research training needs in the biomedical, behavioral, and clinical sciences.

As the Committee looks toward next year, the role of federal support in sustaining and enhancing the quality of training programs looms as a central issue. The difficulties that can be anticipated in dealing with this issue and the Committee's approach to it are discussed below in the section entitled "Federal Support and Training Quality." Following this discussion, an outline is presented of the Committee's plans for the coming year with regard to these additional priority issues:

(1) Field taxonomy and mobility.

(2) Career patterns of federally supported trainees and fellows.

(3) Further development of models of supply-demand systems.

(4) Dissemination of market information.

In addition to the priorities listed above, the Committee plans to broaden its data base, particularly in the areas of clinical sciences, health services research, and nursing research.

Federal Support and Training Quality

In its 1976 report, the Committee stated its intention of exploring the effectiveness and appropriateness of federally supported training programs. Two central issues in this discussion are (1) the federal role in affecting the number of biomedical and behavioral research personnel and (2) the quality of their training. How essential is federal training support in producing a sufficient number of biomedical and behavioral science researchers? Does federal support provide opportunities for training of such high quality that the recipients of this training are likely to make greater contributions to research over the course of their careers?

The first issue--training sufficient numbers of basic biomedical and behavioral science researchers--can be addressed with reasonable certainty. Data presented in Chapters 3 and 4 indicate that, while recent Ph.D. recipients have not been substantially "underemployed," it appears that the number of new graduates will be more than adequate to meet future demands created by expansion of academic labor market opportunities and attrition. Therefore, at the present time, federal support in the basic biomedical and behavioral sciences does not appear to be justified by a need to increase the supply of trained research personnel in these areas.

The question of the need for federal support as a means of enhancing the quality of training is much more difficult--and important--to answer. Enrollment levels and Ph.D. production are easy to quantify; quality is not. Over the past two years, the Committee has sought information regarding training quality. The Committee notes that the training grant mechanism, with its institutional support component, is given very high marks by its recipients. The stability, capability for long-range planning, flexibility, and innovative benefits thought to be derivable from the training grant are praised by department chairpersons. In addition, much available information documents the impressive career outcomes of past recipients of NIH/ADAMHA/HRA training grants and fellowships. Recipients of these awards are more likely to complete their doctoral programs quickly, enter research careers, and produce more publications and citations than other graduate students.[1]

These facts alone do not unequivocally demonstrate that it is the federal support of a program that has made the difference in producing such superior career outcomes. Because they are high-quality students, enrolled in institutions and departments judged by peer review to be outstanding, many of these trainees and fellows might well have found alternative sources of support and gone on to fruitful research careers if federal programs had not been available. All that can be confidently concluded is that the system of national competition for individual fellowships and training grants has succeeded in selecting many of the best students and programs and produced many excellent scientists. Disentangling the relative importance of selection from program effects will be difficult, perhaps impossible. Deciding the significance of federal support for the complex training process may not be easier.

The Committee did, however, seek to gauge the impact of lost NIH/ADAMHA/HRA traineeship/fellowship support on departments that have experienced such losses in the recent past. This was done by utilizing the NSF annual surveys of graduate science student support and by initiating its own survey of biomedical and behavioral science departments. The results from the Committee's own survey have not been compiled in time for inclusion in this year's report. NSF data clearly demonstrate that, over the four-year period from 1972 to 1975, departments rated the highest in quality (by the Roose-Andersen reputational survey) experienced less severe reductions in HEW fellowships/traineeships than other departments, i.e., during this brief period most of the cutbacks were made in departments of lesser or unknown quality rating (Appendixes L and M).

Such information, however, begs the question of what would happen if NIH/ADAMHA/HRA cutbacks were to continue to the point where the top-rated departments' programs were severely reduced in funding. Such departments do receive a higher portion of their student support from these federal sources (Appendixes L and M). How would their training programs be impacted? Would enrollments drop? Would the stable, flexible, and innovative qualities ascribed to these training programs be curtailed or lost?

In initiating its own survey, the Committee has sought to answer some of these questions. Part of the Survey of Biomedical and Behavioral Science Departments was intended to identify specifically departments that have lost NIH/ADAMHA/HRA training grant support. By matching these departments with the trend data available from the NSF surveys, the Committee will attempt to analyze the effect of declining federal support on enrollments and patterns of support.

In addition, the survey included questions concerning the impact of lost institutional support on the training activities of the department. Average department graduate record examination (GRE) scores of entering graduate students have been requested in an attempt to see if falling federal support has adversely affected the quality of students enrolled.

The Committee is aware that information derived from this survey may only begin to clarify the role of federal support in maintaining or improving the quality of training. The interrelationship of various funding sources in a department's training program is very complex, and it is not clear what the comparative advantages of particular training experiences or sequences are in providing preparation for research careers. Melded into these issues is the problem of identifying the distinctive role that federal support may provide in enhancing the training process. The complexities of these issues make them difficult to address in a survey questionnaire. The Committee thus is committed to further exploration of the issue of the federal role in research training quality in the coming year. The following objectives will be pursued:

(1) The impact of recent withdrawals of NIH/ADAMHA/HRA training funds.

(2) The potential impact of such withdrawal on top quality departments.

(3) The peculiar benefits, if any, of federal programs.

(4) The adequacy of alternative support mechanisms to support high-quality training.

Cognizant of the complexities inherent in examining the issue of quality, the Committee will pursue two courses of action. The first will be to analyze thoroughly the data already gathered in its own department survey. This analysis should lead to some conclusions about the impact of lost training-grant support. The second course to be pursued will be to examine in depth a more limited sample of departments, chosen with the aid of the department survey results, in order to probe the complex issues surrounding the role of and need for federal training programs. From this study, a more precise understanding of the role of federal support may emerge.

Field Taxonomy and Mobility

The discussion in Chapter 2 points out the difficulties of studying the manpower needs in the fields of the biomedical and behavioral sciences when no standard definition exists for these fields. A uniform system for classifying the fields would be very helpful in the collection and utilization of data and would improve the prospects for understanding the trends that are taking place. Discussions therefore will be initiated with training officers at the funding agencies concerning the establishment of a standard system of nomenclature. Of particular interest is the utility of a two-dimensional scheme such as that developed by ADAMHA for classifying trainees and fellows. The possibility of developing a similar scheme for fields of interest to NIH and HRA will be explored.

With regard to studying differences in field mobility patterns between training and employment specialties, the

Committee plans to examine data from the Committee's Survey of Biomedical and Behavioral Scientists (NRC, 1976c) and from other available sources. In this examination particular attention will be given to (1) the frequency with which recent biomedical and behavioral science Ph.D. recipients have switched from one particular specialty to another, (2) the extent to which those switching fields consider their graduate training relevant to their employment, and (3) the importance of postdoctoral training in providing opportunities for recent graduates to transfer into new fields of research. A further attempt will be made to identify specialties in which there may be a current shortage of qualified research personnel.

Career Patterns of Federally Supported Trainees and Fellows

The studies in this report describing the employment markets for biomedical and behavioral scientists have dealt with the opportunities for all graduates in these areas. During the next year existing data sources will be used to focus on the training and employment of those graduates who have received either predoctoral or postdoctoral support from NIH and ADAMHA research-training programs. Consideration will be given to (1) the length of graduate and postdoctoral training, (2) the extent to which these graduates utilize their research training in subsequent employment, and (3) the numbers employed on federal research grants and contracts. Since those who have received NIH and ADAMHA research-training support were generally considered to be among the best students, a comparative study of these graduates with other Ph.D. recipients will attempt to control for the quality of their graduate program.

In the clinical sciences area, two closely related studies will address the issue of "career outcomes" of former clinical research trainees supported by NIH/ADAMHA.

(1) The AAMC Faculty Roster will be used to draw a random sample of clinical faculty to examine the "research life" of clinical faculty members. Individuals will be asked to provide information on:

- The proportion of time spent in various research categories at different times.
- Publication history.
- Training received.
- Date of appointment, faculty advancement, etc.

This information will be useful in exploring the productive research life of an individual faculty member--whether the research activity distribution for all ages in 1977 is similar to the research activity distribution from other times, whether it is possible to have substantial research activity without research training, whether certain types of research training experiences yield more productive faculty researchers, and whether the research activity distribution is similar for NIH trainees and non-NIH trainees.

(2) NIH records on individuals who received NIH/ADAMHA-sponsored training will be compared with records of the AAMC Faculty Roster of current and inactive medical school faculty to determine both the total number of trainees who have become faculty members and the number who have a primary responsibility in research. This will permit calculation of the cost of NIH/ADAMHA training grants per faculty member produced or per faculty researcher. It will also allow a comparison of the "success" rates of all institutions that participated in NIH/ADAMHA training programs.

Further Development of Models of Supply-Demand Systems

The manpower projections presented in Chapters 3 and 4 were based on models of demand for biomedical and behavioral scientists in the academic sector. One of the key elements in the overall research plan for this study is to improve these models and extend them if possible to the nonacademic sectors. In particular, the model of demand for clinical faculty, while providing some useful planning guidelines, has some important deficiencies (Chapter 5) that need to be corrected in order to improve its reliability. The conceptual bases of these models, as well as the data required for their implementation, must undergo further development.

In this regard, the Committee will continue to monitor trends in enrollments and degrees. The Office of Education, the National Science Foundation, the National Research Council, and other organizations systematically collect basic data on enrollments and degrees in higher education. One of the important functions of this study is to examine these data in the fields of interest to the Committee and to monitor the trends with a view to making short term projections of the outlook for biomedical and behavioral scientists.

The rate at which Ph.D.'s can be absorbed in nontraditional employment positions is an important item that is not well documented at present. A considerable portion of the faculty positions in the biomedical and behavioral sciences has not been filled by Ph.D.'s but may be in the future. In medical schools, some of the positions vacated by M.D.'s who enter private practice may be filled by Ph.D.'s. Similarly, nonacademic positions are expected to become a more important source of employment for biomedical and behavioral doctorates. Additional information is needed, and will be sought in the coming year, on the rate at which these substitutions can occur.

Several years of data are now available on the personnel contributing in a paid or unpaid status to the research grants of NIH. This information is an important resource for studying the staffing requirements of these grants and thereby allowing estimates to be made of future staffing patterns by field and degree-type. The Committee will continue the effort it began this year to review these data and develop a projection methodology based on them. As stated in Chapter 4 in the behavioral science recommendations, ADAMHA is urged to collect similar information on its research grants and program projects.

Dissemination of Market Information

The Committee plans to issue a technical report based on the basic biomedical science findings of the recent study. This report will focus on the scientists with postdoctoral appointments, since data on this group appear to be a sensitive indicator of the employment opportunities in these fields. It will examine the role of postdoctoral appointments and other nontenured research positions in the academic sector. Data on the number taking these positions, the length of time in these positions, and the subsequent careers of those in such appointments will be reported for fields in the basic biomedical sciences. As discussed in Chapter 3, the Committee believes that efforts should be made to inform all involved in the training of biomedical scientists of the market conditions, and this report will assist in this effort. The basic biomedical sciences technical report will be submitted for publication to a journal with wide circulation as soon as possible after the Committee's 1977 report is published.

Because behavioral scientists who received NIH/ADAMHA predoctoral support represent only 30 percent of the total number of doctorates who graduated between 1971 and 1975, the Committee views the information regarding their training and employment experience of particular importance to an understanding of future training needs. As a result, the Committee plans a separate technical report for the behavioral sciences that will examine the data on these trainees.

FOOTNOTE

1. For evidence of favorable completion rates and publication and citation rates of NIH trainees and fellows, see National Research Council (1976b, Chapter 4). For evidence of greater likelihood of entering research careers, see Appendixes B4 and E4.1.

SUPPLEMENTS

SUPPLEMENT 1

HISTORICAL OVERVIEW

This report is concerned with national needs for high-quality research personnel in the biomedical and behavioral sciences, with federal and other programs for research training, and with program adjustments necessary to continue providing a cadre of research scientists to meet the future health needs of this country. Research training programs must serve the fields with which such scientists are related. This report endeavors to address these relationships.

Historically, federal interest and involvement in biomedical and behavioral research increased dramatically after World War II, in large measure as a result of the demonstration during this war of the immediate beneficial impact of well-organized basic and clinical research. The introduction of penicillin into the treatment of infectious diseases was a striking example. It became clear that expansion of the country's research efforts was in the broad national interest because of its potential for improving human health and welfare. Congress concluded that substantial federal funding was justified because of the unique importance of health for all Americans. A major national commitment was therefore made to support investigation in the biomedical and behavioral sciences in order to improve the health and well-being of all citizens. The enormous growth in federal research support that ensued during the two decades following the war led to the need for a corresponding commitment to the training of adequate numbers of qualified research personnel.

Initially, the needed scientists were either attracted from other fields or trained through the limited existing postdoctoral support. It was clear, however, that predoctoral support of graduate students would be needed in order to assure a continuing increase in the supply of high-quality researchers in these developing sciences. Hence, training grant and fellowship support in the beginning was directed primarily at augmenting the capability of the educational system to supply additional researchers while also seeking to improve the quality of their training. This system, with the support of federal funding, rapidly developed to the point where it now provides an adequate supply of research personnel equipped to carry out the national research effort in many of the biomedical and behavioral fields.

In view of the recent lessening rate of federal investment in biomedical and behavioral research, both the executive and legislative branches of government increasingly have sought to determine the level and kinds of research training support that are needed to meet national health needs. Recognizing the responsibility of the federal government to assess these needs while maintaining its vital role in supporting excellence in research training, Congress passed the NRSA Act of 1974. This had as one of its primary objectives the continued evaluation of the nation's needs for biomedical and behavioral research personnel. The Act directed the Secretary of the HEW to commission such a study by the NAS, which accepted the task and in early 1975 established the present Committee.

The charge given to the Committee under the Act is a formidable one, covering a wide range of issues that over many years and in many ways have been addressed by the Congress, the executive branch, and various professional organizations. In previous attempts to study national health research manpower issues, investigators have stated, and indeed, emphasized, the complexity and difficulty of the task (National Board on Graduate Education, 1974). In its feasibility study (February 1975), an NRC committee pointed out the complexities of the charge and, in concurrence with the Congressional intent, indicated that a long-term continuing study would be needed to deal with these issues satisfactorily. In the Act[1] the Committee is specifically required to:

(1) establish (a) the nation's overall need for biomedical and behavioral research personnel, (b) the subject areas in which such personnel are needed and the number of personnel needed in each area, and (c) the kinds and extent of training which should be provided for such personnel;

(2) assess the current training programs available for the training of biomedical and behavioral research personnel, including those supported by the NIH and the ADAMHA as well as by other sources;

(3) identify the kinds of research positions available to and held by individuals completing such training;

(4) determine to the extent feasible whether, without NIH and ADAMHA research training support, other programs could provide training to an adequate number of individuals to meet the nation's needs established under item 1 above; and

(5) determine what modifications in current NIH, ADAMHA, and other available training programs are necessary to meet these needs.

In its 1975 report (NRC, 1975c), published only 4 months after the feasibility study, the Committee began to address the issues listed above. It divided the overall areas of biomedical and behavioral research into four fields: basic biomedical sciences, clinical sciences, behavioral sciences, and health services research. However, because of the complexity of the issues being addressed and the short time available to collect and review data, the Committee stated in that report that it did not have a sufficiently firm basis upon which to recommend major changes or adjustments within ongoing training support programs. The Committee concluded, therefore, that until it could review and evaluate both the existing data and the individual viewpoints and judgments of its own members, and those of its advisory panels and other constituents of the research training community, it would be best to maintain unchanged the mechanisms, categories, and support levels of federal funding of research training programs in each of the four aggregate fields identified above. Thus, while recommending no changes, the Committee responded to the first two mandates of the Act. With regard to the third task specified in the Act, that of identifying the kinds of research positions available to personnel who complete such research training, the 1975 report presented a brief summary of the employment activities of former NIH trainees and fellows. For these data the Committee drew upon the results of a prior study by another NRC committee of the impact of NIH training programs on the career patterns of bioscientists (NRC,1976b). Chapter IV of the 1975 report addressed the Act's fourth mandate of whether NIH and ADAMHA support of research training is required to meet the nation's needs for research personnel. This was done by examining data collected by the National Science Foundation on other federal and nonfederal programs supporting graduate science students. The impressions gained at that time from this preliminary analysis, although informative, were not conclusive and thus the issue requires further study.

These analytical tasks, though initiated last year, are still basic to the Committe's charge of assessing the national needs for biomedical and behavioral research personnel. Thus they constitute a core of continuing studies that the Committee will reexamine each year as new data are produced and as new developments take place in the research environment.

FOOTNOTE

1. See Supplement 2 for relevant sections of the NRSA Act of 1974.

SUPPLEMENT 2

NATIONAL RESEARCH SERVICE AWARD AUTHORITY

Public Law 93-348, as amended

NATIONAL RESEARCH SERVICE AWARDS

SEC. 472. (a)(1) The Secretary shall— 42 U.S.C. 289l-1

(A) provide National Research Service Awards for—

(i) biomedical and behavioral research at the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration or under programs administered by the Division of Nursing of the Health Resources Administration, in matters relating to the cause, diagnosis, prevention, and treatment of the diseases or other health problems or Division of Nursing.

(ii) training at the Institutes and Administration of individuals to undertake such research,

(iii) biomedical and behavioral research at public institutions and at nonprofit private institutions, and

(iv) pre- and post doctoral training at such public and private institutions of individuals to undertake such research; and

(B) make grants to public institutions and to nonprofit private institutions to enable such institutions to make to individuals selected by them National Research Service Awards for research (and training to undertake such research) in the matters described in subparagraph (A)(i).

A reference in this subsection to the National Institutes of Health or the Alcohol, Drug Abuse, and Mental Health Administration shall be considered to include the institutes, divisions, and bureaus included in the Institutes or under the Administration, as the case may be.

(2) National Research Service Awards may not be used to support residencies.

(3) Effective July 1, 1975, National Research Service Awards may be made for research or research training in only those subject areas for which, as determined under section 473, there is a need for personnel.

(b)(1) No National Research Service Award may be made by the Secretary to any individual unless—

(A) the individual has submitted to the Secretary an application therefor and the Secretary has approved the application;

(B) the individual provides, in such form and manner as the Secretary shall by regulation prescribe, assurances satisfactory to the Secretary that the individual will meet the service requirement of subsection (c)(1); and

(C) in the case of a National Research Service Award for a purpose described in subsection (a)(1)(A)(iii) or (a)(1)(A)(iv), the individual has been sponsored (in such manner as the Secretary may by

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regulation require) by the institution at which the research or training under the Award will be conducted.

An application for an Award shall be in such form, submitted in such manner, and contain such information, as the Secretary may by regulation prescribe.

(2) The award of National Research Service Awards by the Secretary under subsection (a) and the making of grants for such Awards shall be subject to review and approval by the appropriate advisory councils within the Department of Health, Education, and Welfare (A) whose activities relate to the research or training under the Awards, or (B) at which such research or training will be conducted.

(3) No grant may be made under subsection (a)(1)(B) unless an application therefor has been submitted to and approved by the Secretary. Such application shall be in such form, submitted in such manner, and contain such information, as the Secretary may by regulation prescribe. Subject to the provisions of this section other than paragraph (1) of this subsection, National Research Service Awards made under a grant under subsection (a)(1)(B) shall be made in accordance with such regulations as the Secretary shall prescribe.

(4) The period of any National Research Service Award made to any individual under subsection (a) may not exceed three years in the aggregate unless the Secretary for good cause shown waives the application of the three-year limit to such individual.

(5) National Research Service Awards shall provide for such stipends and allowances (including travel and subsistence expenses and dependency allowances) for the recipients of the Awards as the Secretary may deem necessary. A National Research Service Award made to an individual for research or research training at a non-Federal public or nonprofit private institution shall also provide for payments to be made to the institution for the cost of support services (including the cost of faculty salaries, supplies, equipment, general research support, and related items) provided such individual by such institution. The amount of any such payments to any institution shall be determined by the Secretary and shall bear a direct relationship to the reasonable costs of the institution for establishing and maintaining the quality of its biomedical and behavioral research and training programs.

(c)(1)(A) Each individual who receives a National Research Service Award shall, in accordance with paragraph (3), engage in—

(i) health research or teaching or any combination thereof which is in accordance with usual patterns of academic employment,

(ii) if authorized under subparagraph (B), serve as a member of the National Health Service Corps or serve in his specialty, or

(iii) if authorized under subparagraph (C), serve in a health related activity approved under that subparagraph,

for a period computed in accordance with paragraph (2).

(B) Any individual who received a National Research Service Award and who is a physician, dentist, nurse, or other individual trained to provide health care directly to individual patients may, upon application to the Secretary, be authorized by the Secretary to—

(i) serve as a member of the National Health Service Corps,

(ii) serve in his specialty in private practice in a geographic area designated by the Secretary as requiring that specialty, or

(iii) provides services in his specialty for a health maintenance organization to which payments may be made under section 1876 of title XVIII of the Social Security Act and which serves a medically underserved population (as defined in section 1302 (7) of this Act),

in lieu of engaging in health research or teaching if the Secretary determines that there are no suitable health research or teaching positions available to such individual.

(C) Where appropriate the Secretary may, upon application, authorize a recipient of a National Research Service Award, who is not trained to provide health care directly to individual patients, to engage in a health-related activity in lieu of engaging in health research or teaching if the Secretary determines that there are no suitable health research or teaching positions available to such individual.

(2) For each year for which an individual receives a National Research Service Award he shall—

(A) for twelve months engage in health research or teaching or any combination thereof which is in accordance with the usual patterns of academic employment, or, if so authorized, serve as a member of the National Health Service Corps, or

(B) if authorized under paragraph (1)(B) or (1)(C), for twenty months serve in his specialty or engage in a health-related activity.

(3) The requirement of paragraph (1) shall be complied with by any individual to whom it applies within such reasonable period of time, after the completion of such individual's Award, as the Secretary shall by regulation prescribe. The Secretary shall (A) by regulation prescribe (i) the type of research and teaching which an

individual may engage in to comply with such requirement, and (ii) such other requirements respecting such research and teaching and alternative service authorized under paragraphs (1)(B) and (1)(C) as he deems necessary; and (B) to the extent feasible, provide that the members of the National Health Service Corps who are serving in the Corps to meet the requirement of paragraph (1) shall be assigned to patient care and to positions which utilize the clinical training and experience of the members.

(4)(A) If any individual to whom the requirement of paragraph (1) is applicable fails, within the period prescribed by paragraph (3), to comply with such requirement, the United States shall be entitled to recover from such individual an amount determined in accordance with the formula—

$$A=\phi\left(\frac{t-\frac{1}{2}s}{t}\right)$$

in which "A" is the amount the United States is entitled to recover; "ϕ" is the sum of the total amount paid under one or more National Research Service Awards to such individual; "t" is the total number of months in such individual's service obligation; and "s" is the number of months of such obligation served by him in accordance with paragraphs (1) and (2) of this subsection.

(B) Any amount which the United States is entitled to recover under subparagraph (A) shall, within the three-year period beginning on the date the United States becomes entitled to recover such amount, be paid to the United States. Until any amount due the United States under subparagraph (A) on account of any National Research Service Award is paid, there shall accrue to the United States interest on such amount at a rate fixed by the Secretary of the Treasury after taking into consideration private consumer rates of interest prevailing on the date the United States becomes entitled to such amount.

(5)(A) Any obligation of any individual under paragraph (3) shall be canceled upon the death of such individual.

(B) The Secretary shall by regulation provide for the waiver or suspension of any such obligation applicable to any individual whenever compliance by such individual is impossible or would involve extreme hardship to such individual and if enforcement of such obligation with respect to any individual would be against equity and good conscience.

(d) There are authorized to be appropriated to make payments under National Research Service Awards and under grants for such Awards $207,947,000 for the fiscal year ending June 30, 1975, $165,000,000 for fiscal year 1976, and $185,000,000 for fiscal year 1977. Of the sums appropriated under this subsection, not less than 25 per centum shall be made available for payments under National Research Service Awards provided by the Secretary under subsection (a)(1)(A).

STUDIES RESPECTING BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

SEC. 473. (a) The Secretary shall, in accordance with subsection (b), arrange for the conduct of a continuing study to— 42 U.S.C. 289l-2

(1) establish (A) the Nation's overall need for biomedical and behavioral research personnel, (B) the subject areas in which such personnel are needed and the number of such personnel needed in each such area, and (C) the kinds and extent of training which should be provided such personnel;

(2) assess (A) current training programs available for the training of biomedical and behavioral research personnel which are conducted under this Act at or through institutes under the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration, and (B) other current training programs available for the training of such personnel;

(3) identify the kinds of research positions available to and held by individuals completing such programs;

(4) determine, to the extent feasible, whether the programs referred to in clause (B) of paragraph (2) would be adequate to meet the needs established under paragraph (1) if the programs referred to in clause (A) of paragraph (2) were terminated; and

(5) determine what modifications in the programs referred to in paragraph (2) are required to meet the needs established under paragraph (1).

(b)(1) The Secretary shall request the National Academy of Sciences to conduct the study required by subsection (a) under an arrangement under which the actual expenses incurred by such Academy in conducting such study will be paid by the Secretary. If the National Academy of Sciences is willing to do so, the Secretary shall enter into such an arrangement with such Academy for the conduct of such study.

(2) If the National Academy of Sciences is unwilling to conduct such study under such an arrangement, then the Secretary shall enter into a similar arrangement with other appropriate nonprofit private groups or associations under which such groups or associations will conduct such study and prepare and submit the reports thereon as provided in subsection (c).

(3) The National Academy of Sciences or other group or association conducting the study required by subsection (a) shall conduct such study in consultation with the Director of the National Institute of Health.

(c) A report on the results of such study shall be submitted by the Secretary to the Committee on Interstate and Foreign Commerce of the House of Representatives and the Committee on Labor and Public Welfare of the Senate not later than September 30 of each year.

INSTITUTIONAL REVIEW BOARDS; ETHICS GUIDANCE PROGRAM

42 U.S.C. 289l-3

SEC. 474. (a) The Secretary shall by regulation require that each entity which applies for a grant or contract under this Act for any project or program which involves the conduct of biomedical or behavioral research involving human subjects submit in or with its application for such grant or contract assurances satisfactory to the Secretary that it has established (in accordance with regulations which the Secretary shall prescribe) a board (to be known as an "Institutional Review Board") to review biomedical and behavioral research involving human subjects conducted at or sponsored by such entity in order to protect the rights of the human subjects of such research.

(b) The Secretary shall establish a program within the Department under which requests for clarification and guidance with respect to ethical issues raised in connection with biomedical or behavioral research involving human subjects are responded to promptly and appropriately.

PEER REVIEW OF GRANT APPLICATIONS AND CONTRACT PROJECTS

42 U.S.C. 289l-4

SEC. 475. (a) The Secretary, after consultation with the Director of the National Institutes of Health, and, where appropriate, the Directors of the National Institute of Mental Health, the National Institute on Alcohol Abuse and Alcoholism, and the National Institute on Drug Abuse, shall by regulation require appropriate scientific peer review of—

(1) applications made after the effective date of such regulations for grants under this Act for biomedical and behavioral research; and

(2) biomedical and behavioral research and development contract projects to be administered after such effective date through an institute established under this title, the National Institute on Alcohol Abuse and Alcoholism, or the National Institute on Drug Abuse.

(b) Regulations promulgated under subsection (a) shall, to the extent practical, require that the review of grant applications required by the regulations be conducted—

(1) in a manner consistent with the system for scientific peer review applicable on the date of the enactment of this section to applications for grants

under this Act for biomedical and behavioral research, and

(2) by peer review groups performing such review on or before such date.

(c) The members of any peer review group established under such regulations shall be individuals who by virtue of their training or experience are eminently qualified to perform the review functions of the group and not more than one-fourth of the members of any peer review group established under such regulations shall be officers or employees of the United States.

VISITING SCIENTIST AWARDS

SEC. 476. (a) The Secretary may make awards (referred to as "Visiting Scientist Awards") to outstanding scientists who agree to serve as visiting scientists at institutions of post-secondary education which have significant enrollments of disadvantaged students. Visiting Scientist Awards shall be made by the Secretary to enable the faculty and students of such institutions to draw upon the special talents of scientists from other institutions for the purpose of receiving guidance, advice, and instruction with regard to research, teaching, and curriculum development in the biomedical and behavioral sciences and such other aspects of these sciences as the Secretary shall deem appropriate. 42 U.S.C. 289l-5

(b) The amount of each Visiting Scientist Award shall include such sum as shall be commensurate with the salary or remuneration which the individual receiving the award would have been entitled to receive from the institution with which the individual has, or had, a permanent or immediately prior affiliation. Eligibility for and terms of Visiting Scientist Awards shall be determined in accordance with regulations the Secretary shall prescribe.

SUPPLEMENT 3

ISSUES RAISED IN LEGISLATIVE HISTORY OF THE NRSA ACT

Listed below are several important questions that emerged from the legislative history of the Act. The Committee believes that these questions and others that concern the effectiveness and overall impact both of the provisions of the Act and of the guidelines used by the agencies to administer the program must be specifically addressed. They include the following:

1. Does a significant proportion of the students trained in these programs subsequently pursue careers in areas other than biomedical and behavioral research (and teaching)?
2. Are there alternative federal support programs available to students planning research careers in these areas?
3. Are there more appropriate and effective alternatives to the training grant and fellowship mechanisms?
4. Is it inequitable for the federal government to provide more support for graduate students in the biomedical and behavioral sciences than in other areas?
5. Do individuals trained in NIH- and ADAMHA-supported programs subsequently earn incomes that make it reasonable to require them to bear the costs of their own training?
6. Should NIH and ADAMHA provide support for only those unable to pay for their own training?

SUPPLEMENT 4

SUMMARY OF FINDINGS AND RECOMMENDATIONS FROM 1976 REPORT

Basic Biomedical Sciences

The Committee recommended a modest but significant reduction of about 10 percent from the FY 1975 level (6,000) in the number of federally funded predoctoral positions. It was recommended that the number of postdoctoral positions be maintained at the FY 1975 level (3,200). Training grants were urged as the preferable mechanism of support at the predoctoral level, whereas fellowships were recommended for postdoctoral training.

Behavioral Sciences

For the behavioral sciences the Committee recommended that a gradual but significant reorientation of training effort should be initiated because of the growing need for more specialized behavioral science training resulting from increasingly complex research questions in the area of behavior and health. Specifically, the Committee recommended that the existing ratio of 90 percent predoctorals and 10 percent postdoctorals should be inverted, over a period of years, with the ultimate objective of a ratio of 30 percent predoctorals and 70 percent postdoctorals. The Committee recommended that this reorientation be achieved gradually in order to minimize institutional dislocation. The levels recommended by FY 1978 were 55 percent predoctorals and 45 postdoctorals. For FY 1977 and FY 1978 the Committee recommended that the total dollar investment in behavioral science research training stay constant. Thus, for FY 1977, it was recommended that 550 fewer predoctorals be supported than in FY 1975 (1,200 as compared with 1,750) and that 328 more postdoctoral awards be supported than in FY 1975 (540 as compared with 212). For training at both the predoctoral and postdoctoral level it was recommended that the current ratio of 82 percent traineeships to 18 percent fellowships be maintained.

Clinical Sciences

The Committee recommended that 2,800 trainees and fellows at the postdoctoral level be funded in FY 1977 and that this level be maintained through FY 1978. This represented a one-third decrease from the peak level of postdoctorals funded in FY 1969 (about 4,200), when clinical specialty traineeships and some clinical residencies were also being funded, but a 10 percent increase over the number funded by NIH in FY 1975 (about 2,550).

Training grants were recommended as the support mechanism of choice, although 20 percent total support through fellowships was considered appropriate to provide needed flexibility. The Committee recommended that the Medical Scientist Training Program of NIH be expanded slightly to provide for 600 trainees in FY 1977 (an increase from 581 positions authorized in FY 1976 and 500 trainees supported in FY 1975).

Health Services Research

The Committee recommended the maintenance of the current programs for health services research training reported by the NIH and ADAMHA. However, the Committee urged that the HRA continue to serve as the primary locus for health services research training and recommended that the emphasis in this area be shifted from predoctoral to postdoctoral training. It was recommended that training be provided primarily through the training grant mechanism.

Announcement Fields

In view of the absence of published criteria, the Committee questioned the validity of the distinction drawn by the NIH in its announcements between fields that are appropriate for training grants and fields that are appropriate for fellowships and recommended that this practice be discontinued.

The Committee also took the position that NRSA awards for fellowships and training grants should be made solely on the basis of quality within program catgories deemed relevant to the national interest. The Committee could find no basis for determining that any particular subject matter was not appropriate for funding. The Committee therefore emphasized that its recommended reductions in certain areas summarized above should not be achieved by categorical exclusion or limitaton of specific fields.

Identification of Priority Training Fields

After a careful review of the issue of identifying high-priority training fields, the Committee concluded that (1) on the basis of the information then available, designation of specialty fields at the predoctoral level in the biomedical sciences was not warranted, (2) greater emphasis should be placed on postdoctoral training in research relevant to the role of behavior in physical illness and health, (3) primary emphasis in clinical sciences training should be given to training for research on the etiology and pathogenesis of disease, and (4) the area of health services research receive emphasis across the entire spectrum of relevant training fields.

SUPPLEMENT 5

NATIONAL RESEARCH COUNCIL
COMMISSION ON HUMAN RESOURCES

2101 Constitution Avenue Washington, D. C. 20418

COMMITTEE ON A STUDY OF NATIONAL NEEDS FOR
BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

PROGRAM FOR PUBLIC MEETING

November 4, 1976

Auditorium, National Academy of Sciences

8:00 a.m.	REGISTRATION	
9:00 "	INTRODUCTORY REMARKS Dr. Robert Glaser, Chairman Dr. Henry Riecken, Vice Chairman	
	GUIDELINES FOR PARTICIPANTS Dr. Herbert B. Pahl, Staff Director	
Session I		
9:10 a.m.	Norton Nelson	Task Force on Environmental Health
9:22 "	Raymond Seltser	Epidemiology associations
9:34 "	William Jarzembski	Texas Tech. University - Medical Center
9:46 "	George Condouris	American Society for Pharmacology and Experimental Therapeutics
9:58 "	Earl Benditt	Pathology associations
10:10 "	Robert Acker	American Society for Microbiology
10:22 "	Alan Sager	Brandeis University
10:34 "	Jack Rakosky	Franklin College
10:46 "	COFFEE	
Session II		
11:06 "	Marie Cassidy	Federation of Org. for Professional Women
11:18 "	Dalmas Taylor	American Psychological Association
11:30 "	H. Geoffrey Fisher	University of Minnesota
11:42 "	Jacquelyne Jackson	Duke University
11:54 "	Amado Padilla	University of California, Los Angeles
12:06 p.m.	Franklin Hamilton/ Vijaya Melnick	University of Tennessee Federal City College
12:18 "	Jeanne Spurlock	American Psychiatric Association
12:30 "	OPEN DISCUSSION	

1:00 p.m. LUNCH (available in Academy refectory)

Session III

2:00 p.m.	Mortimer Appley	Clark University
2:12 "	Hans Mauksch	American Sociological Association
2:24 "	Lucy Cohen	American Anthropological Association
2:36 "	Michael Pallak	American Psychological Association
2:48 "	Don Cahalan	University of California, Berkeley
3:00 "	Henry David	American Psychological Association
3:12 "	COFFEE	
3:30 "	Gail Marsh	Duke University
3:42 "	Alfred Baumeister	American Psychological Association
3:54 "	Sidney Goldstein	Population Association of America
4:06 "	Etienne van de Walle	University of Pennsylvania
4:18 "	Conrad Taeuber	Georgetown University
4:30 "	Alex Kaplan	American Association for Clinical Chemistry
4:42 "	OPEN DISCUSSION	
5:15 "	DINNER	

Session IV

7:15 p.m.	Walter Abelmann	American College of Cardiology
7:27 "	James Hillis	American Speech and Hearing Association
7:39 "	Alan Cohen	The Arthritis Foundation
7:51 "	Erling Johansen	University of Rochester
8:03 "	C. Lockard Conley	American Society of Hematology
8:15 "	Ada Jacox	American Nurses' Association
8:27 "	COFFEE	
8:45 "	Frank Rosenthal	Medical Committee for Human Rights
8:57 "	Pierre Galletti	Brown University
9:09 "	Donald Denver/	Laval University (Quebec)
	Robert Grove	Laval University (Quebec)
9:21 "	OPEN DISCUSSION	
10:00 "	CLOSE OF MEETING	

OMB No. 68-S76049
Approval expires June 30, 1977

SURVEY OF BIOMEDICAL AND BEHAVIORAL SCIENTISTS

CONDUCTED BY THE NATIONAL RESEARCH COUNCIL

THE ACCOMPANYING LETTER requests your assistance in this survey of biomedical and behavioral scientists.
PLEASE READ the instructions carefully and answer by printing your reply or entering an 'X' in the appropriate box.
PLEASE COMMENT on any questions which you think require fuller explanation.
PLEASE RETURN the completed form in the enclosed envelope to the Commission on Human Resources, JH 638, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

NOTE: ALL INFORMATION YOU PROVIDE WILL BE TREATED AS CONFIDENTIAL AND USED FOR STATISTICAL PURPOSES ONLY.

DEFINITION: POSTDOCTORAL APPOINTMENT means a temporary appointment, the primary purpose of which is to provide for continued education or experience in research usually, though not necessarily, under the supervision of a senior mentor. Included are appointments in government and industrial laboratories which resemble in their character and objectives postdoctoral appointments in universities.

EMPLOYMENT

INSTRUCTIONS: Please answer questions 1 through 10 with respect to your PRINCIPAL employment or postdoctoral appointment AS OF OCTOBER 15, 1976.

1. Which BEST describes your employment status? *(Check only one.)*

1 ☐ Hold postdoctoral appointment (as defined above)
2 ☐ Employed full-time (excluding postdoctoral appointment)
3 ☐ Employed part-time (excluding postdoctoral appointment)
4 ☐ Unemployed and seeking employment
5 ☐ Unemployed and NOT seeking employment
6 ☐ Other status, please specify __________

(9)

NOTE: If you checked items 4, 5, or 6 above, you may skip to Question [illegible]1 on page 3.

2. What is the name and location of your employer/postdoctoral affiliation?

__________ *Name of Institution/Organization* __________ *City* __________ *State* (10-15)

3. Which category below best describes the type of organization of your employer/postdoctoral affiliation? *(Check only one.)*

Educational Institution

1 ☐ Medical school (including university-owned or -affiliated teaching hospital)
2 ☐ Other health professional school
3 ☐ University or 4-year college
4 ☐ 2-year college or technical school
5 ☐ Elementary or secondary school
6 ☐ Other educational institution

Government

7 ☐ Federal government (including national laboratory and military)
8 ☐ State or local government

Business

9 ☐ Self-employed
10 ☐ Pharmaceutical firm
11 ☐ Other business or industry

Other Sectors

12 ☐ Hospital or clinic (other than those included above)
13 ☐ Nonprofit organization (other than those included above)
14 ☐ Other type of employer

(16-17)

4. If employed by an EDUCATIONAL INSTITUTION ***(applies to items 1 to 4 and item 6 in Question 3),***

a. what is the rank of your position?

1 ☐ Professor
2 ☐ Associate Professor
3 ☐ Assistant Professor
4 ☐ Instructor/lecturer
5 ☐ Research staff (not included above)
6 ☐ Other, please specify____________________ (18)

b. do you have tenure?

1 ☐ Yes 2 ☐ No (19)

c. if NO, is your position considered to be in a tenured track?

1 ☐ Yes 2 ☐ No (20)

5. From the list of specialty areas below, select the ONE area most closely related to your employment or postdoctoral appointment, and enter its title and two digit code below. Write in your specialty if it is not on the list.

______ ______________________________ (21-22)
Code ***Title of Employment/Postdoctoral Specialty***

LIST OF SPECIALTY AREAS (The following codes are to be used in Question 5 and Question 11a.)

BEHAVIORAL SCIENCES

00 - Behavioral Genetics
01 - Clinical Psychology
02 - Cognitive Psychology
03 - Counseling and Guidance
04 - Human Development and Developmental Psychology
05 - Human Learning and Performance
06 - Neurobehavioral Sciences
07 - Perceptual and Sensory Psychology
08 - Personality and Experimental Psychopathology
09 - Physiological and Comparative Psychology
10 - Psycholinguistics
11 - Psychopharmacology
12 - Psychophysics and Psychometrics

13 - Social Psychology

20 - Community and Urban Sociology
21 - Complex Organizations and Professions
22 - Criminology, Delinquency, and Deviant Behavior
23 - Demography
24 - Medical Sociology
25 - Sociolinguistics

30 - Biological Anthropology
31 - Medical Anthropology
32 - Social and Cultural Anthropology

40 - Ethology and Sociobiology

41 - Statistics and Methodology

42 - Communication Sciences

43 - Gerontology

44 - Behavioral Sciences, other

BIOMEDICAL SCIENCES

50 - Animal Sciences (including Animal Husbandry and the basic sciences underlying Veterinary Medicine)
51 - Biochemistry and Molecular Biology
52 - Biophysics (including the structure of macromolecules and membranes)
53 - Biomathematics and Biostatistics
54 - Biomedical Engineering
55 - Cell Biology (including cell fine structure)
56 - Developmental Biology (including Embryology)
57 - Environmental Health and Toxicology
58 - Epidemiology
59 - Evolutionary and Taxonomic Biology
60 - Genetics
61 - Immunology
62 - Microbiology (including Parasitology)
63 - Morphological Sciences (including Anatomy and Histology)
64 - Neurobiology
65 - Nutrition and Food Sciences
66 - Pathology
67 - Pharmacology and Pharmaceutical Sciences
68 - Physiology
69 - Virology
70 - Biology/Ecology, general
71 - Biomedical Sciences, other

OTHER FIELDS

80 - Agriculture
81 - Astronomy and Physics *(see also 52)*
82 - Bioethics
83 - Business Administration
84 - Chemistry *(see also 51)*
85 - Earth Sciences (including Geology and Marine Sciences)
86 - Education
87 - Engineering *(see also 54)*
88 - Mathematics *(see also 53)*
89 - Public Health *(see also 58)*
90 - Social Sciences *(other than behavioral)*
91 - Other

6. Approximately what percent of your time do you devote to each of the following activities?

a. Research/development __________ % (23-25)
b. Teaching __________ % (26-28)
c. Administration/management __________ % (29-31)
d. Consulting __________ % (32-34)
e. Professional service (other than consulting) __________ % (35-37)
f. Other, please specify__________ __________ % (38-40)
____________________ 100 %

NOTE: If you do NOT devote ANY of your time to RESEARCH, you may skip to Question 10a.

7. Which of the following federal agencies, if any, support or sponsor your research? *(Check all that apply.)*

1 ☐ No federal support
2 ☐ ADAMHA (National Institute of Mental Health, National Institute on Alcohol and Alcoholism, and National Institute on Drug Abuse)
3 ☐ HRA (National Center for Health Statistics, National Center for Health Services Research, Bureau of Health Manpower, Bureau of Health Planning and Resources Development)
4 ☐ NIH (National Institutes of Health)
5 ☐ Other federal agency, please specify________________
____________________________________ (41-45)

8a. To what degree do you consider this research related to health?

1 ☐ Directly related 2 ☐ Indirectly related 3 ☐ Unrelated (46)

b. Briefly describe the PRIMARY research problem on which you are working.

____
____
____

9. Does your research directly involve human subjects (or animals in the case of veterinary science research) or samples derived therefrom, as part of a CLINICALLY-ORIENTED study?

1 ☐ Yes 2 ☐ No (47)

NOTE: Salary information will be used for AGGREGATE COMPARISONS among fields and employment sectors, and will NOT be released in any way that will allow it to be identified with you or your organization.

10a. What is the BASIC SALARY* associated with your principal employment? If you hold a postdoctoral appointment (as defined on page 1) and receive a stipend, include the stipend plus allowances.

$________per year OR $________per academic year (9-10 months) (48-50)

b. Approximately what percent of this salary is derived from FEDERAL research grants/contracts and from FEDERAL research training funds? *(If NONE, indicate '0'.)*

________% federal research grants/contracts (51-53)

________% federal research training funds (54-56)

*Includes your salary before deductions for income tax, social security, retirement, etc., but does not include bonuses, overtime, summer teaching, consulting, or other payment for professional work.

TRAINING

11a. From the list of specialty areas on page 2, select the ONE area most closely related to your doctorate (Ph.D. or equivalent), and enter its title and two digit code below. Write in your specialty if it is not on the list.

______ *Code* ____________________________ *Title of Ph.D. Specialty* (57-58)

b. To what degree do you consider your employment/postdoctoral specialty (Question 5) related to your Ph.D. specialty?

1 ☐ Closely related 2 ☐ Somewhat related 3 ☐ Not at all related (59)

12. What was your PRIMARY source of support for each of the FIRST FOUR years of your graduate study? *(Check only ONE for EACH year.)*

	Year of Graduate Study			
	1st	*2nd*	*3rd*	*4th*
1 NIH/ADAMHA/HRA (as defined in Question 7) training grant or fellowship	☐	☐	☐	☐
2 Other federal training grant or fellowship	☐	☐	☐	☐
3 Federal research grant or contract	☐	☐	☐	☐
4 University or State (including teaching asst.)	☐	☐	☐	☐
5 Other sources (excluding personal resources)	☐	☐	☐	☐
6 Received support but don't know source	☐	☐	☐	☐
7 Personal resources (including income, savings, loans, family assistance, etc.)	☐	☐	☐	☐
	(60)	(61)	(62)	(63)

13. Answer the following question ONLY IF you received SOME FEDERAL support during your graduate study:

If the federal support you received had NOT been available and it had been necessary for you to substitute for it funds derived ENTIRELY from personal resources, would you have been able to earn the doctorate in the specific program you selected?

1 ☐ Yes 2 ☐ No 3 ☐ Uncertain (64)

14. Did the availability of financial support for graduate education significantly affect your selection of a doctoral field?

1 ☐ Yes 2 ☐ No 3 ☐ Uncertain (65)

15a. Did you take a postdoctoral appointment (as defined on page 1) WITHIN A YEAR after completing ALL requirements for the doctorate (including acceptance of your dissertation)?

1 ☐ Yes 2 ☐ No (66)

b. If YES, what was the MOST important reason for taking this appointment? *(Check only one.)*

1 ☐ Couldn't find suitable employment position
2 ☐ Wanted additional research experience in my doctoral field
3 ☐ Interested in switching into a different field of research
4 ☐ Other reason, please specify____________________

(67)

c. If NO, what was the MOST important reason for NOT taking a postdoctoral appointment? *(Check only one.)*

1 ☐ Couldn't obtain adequate support for a postdoctoral appointment
2 ☐ Held suitable employment position
3 ☐ Had an attractive employment opportunity
4 ☐ Entered M.D. or other professional degree program
5 ☐ Felt that I would derive little or no benefit from a postdoctoral appointment
6 ☐ Other reason, please specify____________________

(68)

16. If you held a postdoctoral appointment AS OF OCTOBER 15, 1976,

a. what was the PRIMARY source of support for this appointment? *(Check only one.)*

1 ☐ NIH/ADAMHA/HRA (as defined in Question 7) training grant or fellowship
2 ☐ Other federal training grant or fellowship
3 ☐ Federal research grant or contract
4 ☐ University or State (including teaching asst.)
5 ☐ Other sources (excluding personal resources)
6 ☐ Don't know source
7 ☐ Personal resources (including income, savings, loans, family assistance, etc.)

(69)

b. have you prolonged your appointment(s) as a result of difficulty in finding suitable employment? (70)

1 ☐ Yes 2 ☐ No

UTILIZATION

17. Please indicate below the number of MONTHS you have spent in each of the following endeavors since the date you completed ALL requirements for the doctorate (including acceptance of your dissertation). If you held two positions simultaneously, include only the PRINCIPAL position.

Months

a. ______ Held postdoctoral appointment (as defined on page 1) (9-10)

b. ______ Employed full-time (excluding postdoctoral appointments) (11-12)

c. ______ Employed part-time (excluding postdoctoral appointments) (13-14)

d. ______ Unemployed and seeking employment (15-16)

e. ______ Unemployed and NOT seeking employment (17-18)

f. ______ Other status, please specify ______________________________ (19-20)

g. ______ TOTAL (should equal the total months that elapsed between completion of ALL doctoral requirements and October 15, 1976.) (21-22)

18. How important was your doctoral DEGREE in enabling you to attain your present position? *(Check only one.)*

1 ☐ Essential qualification
2 ☐ Helpful, but not essential
3 ☐ Unimportant
4 ☐ Cannot ascertain
(23)

19. What is the minimum level of training necessary to adequately fulfill your present job requirements?

1 ☐ Postdoctoral
2 ☐ Doctorate
3 ☐ Master's degree
4 ☐ Baccalaureate
5 ☐ Other, please specify ______________________
(24)

20. To what extent do you consider your overall predoctoral experience in RESEARCH important to your present position? *(Check only one.)*

1 ☐ Essential to job performance
2 ☐ Useful, but not essential
3 ☐ Not useful
4 ☐ Cannot ascertain
(25)

21. Which of the following BEST describes your immediate career plans? *(Check only one.)*

1 ☐ Not actively seeking new employment
2 ☐ Actively seeking new employment because of dissatisfaction with my current position
3 ☐ Actively seeking new employment because my current position terminates shortly
4 ☐ Other, please specify ______________________
____
(26)

22. Given the opportunity, in which of the following settings would you MOST like to work? *(Check only one.)*

1 ☐ Medical or other health professional school
2 ☐ College or university
3 ☐ Business or industry
4 ☐ Federal, state, or local government
5 ☐ Other, please specify ______________________
____
(27)

23. **Given the opportunity, approximately what percent of your time would you LIKE to devote to each of the following work activities?**

a. Research/development	_____ %	(28-30)
b. Teaching	_____ %	(31-33)
c. Administration/management	_____ %	(34-36)
d. Consulting	_____ %	(37-39)
e. Service (other than consulting)	_____ %	(40-42)
f. Other, please specify_______________ _______________	_____ % 100 %	(43-45)

24. **If you earned your doctorate in one of the BIOMEDICAL fields (see list of specialty areas on page 2) OR you are engaged in RESEARCH in one of the BIOMEDICAL fields,**

a. **please rank in order of importance the technical skills or techniques that you used in your doctoral training and in your present employment** ***(rank at most three in each column, using '1' to indicate the most important).***

	Ph.D.	*Empl.*	
1	_____	_____	Biochemical: Analytical
2	_____	_____	Biochemical: Enzymological
3	_____	_____	Biochemical: Immunological
4	_____	_____	Biochemical: Isotopic
5	_____	_____	Biochemical: Organic
6	_____	_____	Histological and Cytological
7	_____	_____	Ultra Structure: Morphological
8	_____	_____	Microbiological, Viral and Cell Culture
9	_____	_____	Electrophysiological
10	_____	_____	Physiological, other (including behavioral)
11	_____	_____	Physical and Spectroscopic
12	_____	_____	Instrumentational
13	_____	_____	Computational and Theoretical
14	_____	_____	Published Data Analysis
15	_____	_____	Interview Techniques
16	_____	_____	Other, please specify_______________
	(46-51)	(52-57)	

b. **check in EACH column below the ONE category which BEST describes your research approach during doctoral training and present employment.**

	Ph.D.	*Empl.*	
1	☐	☐	Small Biomolecules
2	☐	☐	Macromolecules
3	☐	☐	Tissue Homogenates and Extracts
4	☐	☐	Organelles: Mitochondria, Chloroplasts
5	☐	☐	Subcellular Structures, Other
6	☐	☐	Cell Culture
7	☐	☐	Tissue and Organ Culture
8	☐	☐	Micro-organisms
9	☐	☐	Experimental Plants
10	☐	☐	Experimental Animals
11	☐	☐	Human Subjects
12	☐	☐	Populations
13	☐	☐	Mathematical Models
14	☐	☐	Other, please specify_______________
	(58-59)	(60-61)	

THANK YOU FOR YOUR COOPERATION.

HEALTH SERVICES RESEARCH PERSONNEL

PLEASE COMPLETE the questions below **AND** the enclosed green questionnaire.

IF YOU HAVE COMPLETED THE GREEN QUESTIONNAIRE within the past few months, please complete this **PINK SHEET ONLY.**

RETURN BOTH this form and the green questionnaire in the enclosed envelope to the Commission on Human Resources, JH 717, National Research Council, 2101 Constitution Ave. N.W., Washington, D.C. 20418.

NOTE: We are interested in obtaining information about any RESEARCH TRAINING you may have received which qualifies you as an investigator in HEALTH SERVICES RESEARCH. The enclosed questionnaire has been designed primarily for persons who hold a PhD or equivalent research doctorate (EdD, DSc, et al.) in the biomedical or behavioral sciences. We are extending this survey to include all persons who are investigators in HEALTH SERVICES RESEARCH *regardless of discipline or level of training.*

In completing the green questionnaire:

1. please answer all questions with respect to any FORMAL research training you have received,
2. if you do NOT hold a RESEARCH DOCTORATE, interpret such terms as "doctoral", "graduate" or "postdoctoral" with respect to your highest level of RESEARCH training (exclude periods of professional training or clinical residencies.)

A. For EACH degree you hold in the list below, indicate the YEAR in which it was awarded:

	DEGREE AWARDED	YEAR AWARDED	
1	BA/BS	______	(6-7)
2	MA/MS	______	(8-9)
3	MPH	______	(10-11)
4	PhD/EdD/DSc	______	(12-13)
5	EngD	______	(14-15)
6	DNSc	______	(16-17)
7	MD/DDS/DVM	______	(18-19)
8	Other training, specify:		
	____________	______	(20-21)
	____________	______	(22-23)

DEFINITION: Health services research describes and analyzes the processes of health care through the application of quantitative, population, and sociomedical methods. Health services research seeks to increase the efficiency and effectiveness of the health care system so that the products of biomedical and behavioral research are made available promptly and equitably.

B. If you devote ANY of your time to HEALTH SERVICES RESEARCH, please indicate in the PRIMARY column below, the ONE research topic to which you devote the MOST TIME. In the OTHERS column, check all the research topics (but no more than THREE) to which you devote SOME TIME.

If you are not engaged in health services research at this time, check this box: ☐ (24)

	PRIMARY	OTHERS	
1	☐	☐	Health Facilities
2	☐	☐	Health Manpower
3	☐	☐	Ambulatory Care
4	☐	☐	Dental Health Services
5	☐	☐	Emergency Health Services
6	☐	☐	Health Services for the Disadvantaged
7	☐	☐	Long Term Care
8	☐	☐	Nursing Health Services
9	☐	☐	Pharmacy-related Health Services
10	☐	☐	Economics (including Health Insurance), Inflation, Cost Containment & Production
11	☐	☐	Legal Aspects of Health Care, including Regulatory Studies
12	☐	☐	Quality Assurance of Health Services
13	☐	☐	Services Organization, Planning & Administration
14	☐	☐	Utilization of Health Services
15	☐	☐	Community Studies
16	☐	☐	Evaluation Research
17	☐	☐	Health Statistics
18	☐	☐	Health Status, including Indicators Development
19	☐	☐	Systems Analysis
20	☐	☐	Health Care Technology & Technology Assessment
21	☐	☐	Sociobehavioral Aspects of Health Care, including Compliance
22	☐	☐	Other, please specify ________
	(25-26)	(27-32)	

C. What percent of your total work time do you devote to health services research? ______% (33-36)

OMB No. 68-S76059
Approval Expires May 30, 1977

SURVEY OF BIOMEDICAL AND BEHAVIORAL SCIENCE DEPARTMENTS

COMMITTEE ON A STUDY OF NATIONAL NEEDS FOR BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

NATIONAL RESEARCH COUNCIL

PLEASE RETURN BY FEBRUARY 7, 1977.

____
(Name of Respondent)

____
(Department)

____
(School or College within University) (B)

____
(Telephone No.)

THE ACCOMPANYING LETTER requests your assistance in this survey of biomedical and behavioral science departments.

PLEASE READ the instructions carefully and answer by printing your reply or checking the appropriate box.

PLEASE COMMENT on any questions which you think require fuller explanation.

PLEASE RETURN the completed form in the enclosed envelope to the Commission on Human Resources, JH 638, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418, no later than February 7, 1977. If you have any questions about the survey, please call collect Robert G. Snyder at (202) 389-6656.

GENERAL INSTRUCTIONS

Graduate students and postdoctorals should be reported in only one department. An individual in an interdisciplinary program should be reported only in the department in which he/she is primarily enrolled. Please coordinate your reply with other departments if necessary.

Questions requesting data on the support of students should be reported only by the PRIMARY (largest single) source of support. Each individual should be counted only once, by his/her major source of support. Data are requested only for students who are enrolled FULL-TIME. Full-time status may include any combination of research, teaching, and study activities that your institution defines as constituting full-time.

Information relating to FACULTY is requested for both individuals and full-time equivalents (FTE). Include as faculty those with regular faculty appointments AND those with research appointments EXCLUDING POSTDOCTORALS (see definition below). Use your own institution's definition of what constitutes "full-time."

DEPARTMENTS OF PSYCHOLOGY: Please note special instructions throughout this questionnaire AND complete and return the BEIGE INSERT SHEET along with the blue questionnaire.

DEFINITIONS

TRAINEES–See definition under TYPES OF SUPPORT, TRAINING GRANTS.

TRAINING LEVELS:

PREDOCTORALS–graduate students enrolled in a degree program, usually a discipline, leading to a Ph.D. or equivalent. EXCLUDE MEDICAL STUDENTS working for professional degrees, but INCLUDE students in dual degree programs (e.g., M.D.-Ph.D.).

POSTDOCTORALS–includes only those individuals with science or engineering doctorates or those with professional doctorates (M.D., D.D.S., D.V.M., etc.) who, under TEMPORARY APPOINTMENTS, devote full-time to research activities or study in the department, usually for a SPECIFIC TIME PERIOD, and who carry NO ACADEMIC RANK. EXCLUDE HOSPITAL HOUSE STAFF unless their primary objective is RESEARCH TRAINING under a senior mentor.

POST-PH.D.–specialized research training taking place after receipt of a Ph.D. or equivalent degree.

POST-M.D.–research training taking place after receipt of a professional doctorate (M.D., D.D.S., D.V.M., etc.).

SOURCES OF SUPPORT:

NIH–The National Institutes of Health.

ADAMHA–The Alcohol, Drug Abuse, and Mental Health Administration. Since this agency was not extant as a single entity in 1972, make 1972 and 1976 years comparable by aggregating the three component institutes: Alcohol Abuse and Alcoholism, Drug Abuse, and Mental Health.

HRA–Health Resources Administration.

INSTITUTION/STATE–refers to sources of support within the academic institution itself and those from state and local governments.

SELF—individuals receiving their primary source of support from personal, family, and loan sources.

TYPES OF SUPPORT:

TRAINING GRANTS—grants awarded by the federal government to institutions for individual departments or a consortium of departments for training in a specific field. Grants provide for trainee costs (largely stipends) and INSTITUTIONAL SUPPORT (including expenses for salaries, special seminars, courses, equipment, and supplies). Individuals supported on such awards are TRAINEES.

FELLOWSHIPS—awards made directly to the individual, consisting of a stipend and an institutional subvention in lieu of tuition. Individuals supported on such awards are FELLOWS.

RESEARCH ASSISTANTSHIPS—predoctoral support provided for work performed on a research grant or contract. (The postdoctoral equivalent is the research associateship.)

TEACHING ASSISTANTSHIPS—predoctoral support provided for work performed as part of teaching programs.

PART A: DEPARTMENT AND JOB MARKET INFORMATION

INSTRUCTIONS: All departments complete Part A.

A1. In what year did your department award its first doctorate? 19_____ (9-10)

A2. What has been the number of predoctorals, postdoctorals, and faculty for the last three years and what is your estimate of their levels for Fall 1977 and Fall 1981? (Note: any data provided below comes from the NSF Survey of Graduate Science Student Support and Postdoctorals, Fall 1974 and Fall 1975. Please correct as necessary.)

	Fall				
	1974	*1975*	*1976*	*(est.) 1977*	*(est.) 1981*
1. Full-time predoctoral enrollments	_____(11-13)	_____(14-16)	_____(17-19)	_____(20-22)	_____(23-25)
2. Full-time postdoctorals	_____(26-27)	_____(28-29)	_____(30-31)	_____(32-33)	_____(34-35)
3. Total faculty	_____(36-37)	_____(38-39)	_____(40-41)	_____(42-43)	_____(44-45)
4. Full-time equivalent (FTE) faculty	_____(46-47)	_____(48-49)	_____(50-51)	_____(52-53)	_____(54-55)

A3. As of Fall 1976, how many of your full-time predoctoral students (as shown in Question A2) were in terminal masters degree programs? ________ (56-58)

A4. If any net changes occurred between 1974 and 1976 (as shown in A2) in either the number of predoctorals or postdoctorals, please identify the primary factors that contributed to these net changes. Rank order the top 3 factors, using "1" as the most important, "2" as the next most important, and "3" as the third most important.

Changes in	*Predoctorals (rank 3)*	*Postdoctorals (rank 3)*
1. Federal fellowship/traineeship support	________	________
2. Federal research grant/contract support	________	________
3. Institution/state support	________	________
4. Number of applicants	________	________
5. Quality of applicants	________	________
6. Demand for graduates in your field	________	________
7. Competition for places in medical/ professional schools	________	________
8. Faculty size	________	________
9. Other, specify: ____________	________ (59-61)	________ (62-64)

A5. As a measure of the health-related research effort in your department, how many of your total faculty (as shown in Question A2, line 3) APPLIED FOR OR HELD NIH, ADAMHA, or HRA awards for research or research training (e.g., training grants or research grants/contracts) in academic years Fall 1975 and Fall 1976? (Note: for each year, count each individual only once; include only principal investigators.)

_________ Fall 1975 (65-66)

_________ Fall 1976 (67-68)

A6. How many faculty vacancies will be created through academic year 1981-82 due to retirements?

Total faculty retirements_________(69-70) FTE faculty retirements_________(71-72)

A7. For ANY of the academic years 1974-75 through 1976-77, has your department been either a SOLE RECIPIENT of an NIH/ADAMA/HRA training grant or PARTICIPATED in an interdepartmental training grant from any of these agencies? (Include both training grants under the old training grant program and the new NRSAA awards.)

1 ☐ Yes 2 ☐ No (73)

A8. a) Using the combined verbal and quantitative GRE aptitude tests (e.g., 600 + 700 = 1300), what was the AVERAGE OF THE COMBINED test scores for those admitted to the first year of graduate training in your department for the years Fall 1974 through Fall 1976?

Fall 1974 Average_________ (8-11) Fall 1975 Average_________ (12-15) Fall 1976 Average_________ (16-19)

b) Do you require GRE test scores for admission? 1 ☐ Yes 2 ☐ No (20)

A9. Does your department LIMIT the number of full-time predoctoral students it ADMITS based on what it foresees as the future job market?

1 ☐ Yes 2 ☐ No (21)

A10. a) Does your department LIMIT the number of full-time predoctoral students it ADMITS based on what it foresees as the support that will be available to students throughout their graduate student years?

1 ☐ Yes 2 ☐ No (22)

b) If YES, indicate the PRIMARY source considered in your department's planning.

Sources	*Primary (check only one)*
1. Federal	☐
2. Institution/state	☐
3. Other, specify:_________________________	☐

(23)

A11. a) Subject to satisfactory academic performance of the student, does your department provide reasonable assurance of full stipend or salary and remission of full tuition-fees to ANY of your predoctoral students? (Note: Use your own institution's definition of what constitutes "full tuition-fees" and "full stipend or salary.")

1 ☐ Yes 2 ☐ No (24)

b) If YES, then over the last three years approximately what percent of your full-time students has been assured of such support?

_______percent (25-26)

c) If YES, then for approximately how many years is such support customarily provided for a full-time student?

_______years (27)

A12. Based on experience, how many full-time years of study does the AVERAGE predoctoral student take to complete his/her doctorate in your department?

_______years (28)

A13. a) Does your department have a policy restricting full-time predoctoral students from engaging in regular nonacademic employment?

1 ☐ Yes 2 ☐ No (29)

b) If YES, would your department permit such employment if overall federal and institution/state sources were sharply cut back?

1 ☐ Yes 2 ☐ No (30)

A14. From your placement experience during the last three years, how would you characterize the state of the job market for the fields into which your recent doctorate recipients and postdoctorals enter? (Exclude postdoctoral appointments in assessing the job market for recent doctorate recipients.) (NOTE TO DEPARTMENTS OF PSYCHOLOGY: Please respond only with respect to the placement of personnel who are NOT IN SERVICE-ORIENTED fields.)

	Recent Doctorate Recipients (check only one)	*Postdoctorals*	
		Post-Ph.D. (check only one)	*Post-M.D. (check only one)*
1. CRITICAL SHORTAGE: demand far exceeds supply; many jobs going unfilled	☐	☐	☐
2. MODERATE SHORTAGE: demand somewhat exceeds supply	☐	☐	☐
3. MARKET BALANCE: supply and demand in equilibrium	☐	☐	☐
4. MODERATE SURPLUS: supply somewhat exceeds demand	☐	☐	☐
5. CRITICAL SURPLUS: supply greatly exceeds demand; many job seekers out of work or underemployed (i.e., not fully utilizing their skills)	☐ (31)	☐ (32)	☐ (33)

A15. a) Does your department make an ORGANIZED effort to provide APPLICANTS for predoctoral study information concerning the current and/or projected state of the labor market in your field?

1 ☐ Yes 2 ☐ No (34)

b) If YES, check all that apply:

1. ☐ Provide national data about the labor market
2. ☐ Provide information about positions recent graduates have taken
3. ☐ Counsel individuals about career options
4. ☐ Other, specify:________________________ (35-38)

A16. a) Do you feel that more systematic and up-to-date information concerning the state of the labor market in your field is needed?

1 ☐ Yes 2 ☐ No (39)

b) If YES, and if such information were available, would you distribute it to current and prospective graduate students?

1 ☐ Yes 2 ☐ No (40)

A17. If a worsening job market situation develops, what action would you be prepared to take regarding your department's predoctoral enrollment?

Check all that apply:

1. ☐ Provide market information to prospective students
2. ☐ Limit enrollment—tighten admissions standards
3. ☐ Reduce financial support
4. ☐ De-emphasize doctoral output and encourage masters programs
5. ☐ Other, specify:________________________
6. ☐ No action (41-46)

A18. a) Has there been any change in recent years in the AVERAGE length of time that persons in your department have been on POSTDOCTORAL status (i.e., including all postdoctoral appointments the individual might have taken immediately prior to entering his/her current position)?

1 ☐ Yes 2 ☐ No (47)

b) If YES, has the average time 1 ☐ lengthened 2 ☐ shortened (48)

c) If the average time has LENGTHENED, what is the PRIMARY factor to which you would attribute this phenomenon?

Check ONE:

1. ☐ Increased postdoctoral support available
2. ☐ Professional incentives for more advanced training/specialization
3. ☐ Worsening job market
4. ☐ Other, specify: ______________________________ (49)

A19. From your experience, have the new Ph.D.'s recently appointed to your faculty been adequately prepared for teaching responsibilities?

1 ☐ Yes 2 ☐ No (50)

PART B: NIH/ADAMHA/HRA TRAINING GRANTS AND FELLOWSHIPS

INSTRUCTIONS: If your department CURRENTLY has any NIH/ADAMHA/HRA fellowships or training grants, please complete this section. If not, then proceed to PART C.
(NOTE TO DEPARTMENTS OF PSYCHOLOGY: Complete this section with respect to RESEARCH TRAINING ONLY; exclude information regarding clinical training.)

B1. As of Fall 1976, how many of your full-time predoctorals and postdoctorals were supported by NIH, ADAMHA, and HRA fellowships and traineeships?

	Predoctoral		*Postdoctoral*	
Agency	*Fellows*	*Trainees*	*Fellows*	*Trainees*
1. NIH	________ (51-52)	________ (53-54)	________ (55-56)	________ (57-58)
2. ADAMHA	________ (59-60)	________ (61-62)	________ (63-64)	________ (65-66)
3. HRA	________ (67-68)	________ (69-70)	________ (71-72)	________ (73-74)

B2. In terms of the QUALITY of the PREDOCTORAL students currently in your department, where would you rank NIH/ADAMHA/HRA trainees and fellows?

	Better than Average	*Below Average*	*No Difference*	
1. NIH/ADAMHA/HRA predoctoral TRAINEES	1 ☐	2 ☐	3 ☐	(75)
2. NIH/ADAMHA/HRA predoctoral FELLOWS	1 ☐	2 ☐	3 ☐	(76)

B3. If your department were to lose its NIH/ADAMHA/HRA training grant/fellowship support in the near future, would your department seek alternative REPLACEMENT support from the federal government?

1 ☐ Yes 2 ☐ No 3 ☐ Do not know (77)

B4. If your department were to lose its NIH/ADAMHA/HRA training grant/fellowship support in the near future, what actions would you anticipate your department taking if alternative replacement support were NOT available?

Check all that apply:

1. ☐ Permit a greater percentage of predoctoral students to be self-supporting; would this include engaging in outside employment? 1 ☐ Yes 2 ☐ No (8)
2. ☐ Reduce enrollment
3. ☐ Spread remaining discretionary federal, state, and institution funds more widely
4. ☐ Other, specify: ______________________________ (9-13)
5. ☐ No action

PART C: NIH/ADAMHA/HRA TRAINING GRANTS

INSTRUCTIONS: Complete PART C ONLY if your department has received SOME NIH/ADAMHA/HRA TRAINING GRANT support at ANY time during the period from Fall 1972 to the present. If you have not, thank you for completing the questionnaire.
(NOTE TO DEPARTMENTS OF PSYCHOLOGY: Complete this section with respect to RESEARCH TRAINING GRANTS ONLY; exclude information regarding grants for clinical training.)

C1. For the years Fall 1972 and Fall 1975, please provide the following information for full-time predoctoral students and postdoctorals in your department. (Note: any data provided below comes from the NSF Survey of Graduate Science Student Support and Postdoctorals, Fall 1972 and 1975. Please correct as necessary.)

	Fall 1972		*Fall 1975*	
	Predoc.	*Postdoc.*	*Predoc.*	*Postdoc.*
1. Full-time predoctoral enrollments/postdoctorals	____ (14-16)	____ (17-19)	____ (20-22)	____ (23-25)
2. Of these, how many were full-time trainees	____ (26-27)	____ (28-29)	____ (30-31)	____ (32-33)

C2. Please provide the training grant numbers for each grant which was active in either Fall 1972 or Fall 1975. Include both training grants for which your department was the sole recipient AND those interdepartmental grants in which your department was a participant.

		Check If Grant Active in Fall	
	Training grant awards	*1972*	*1975*
	1. Grant No. ____________ (34-40)	☐ (41)	☐ (42)
(if applicable)	2. Grant No. ____________ (43-49)	☐ (50)	☐ (51)
"	3. Grant No. ____________ (52-58)	☐ (59)	☐ (60)
"	4. Grant No. ____________ (61-67)	☐ (68)	☐ (69)
"	5. Grant No. ____________ (70-76)	☐ (77)	☐ (78)

C3. From Fall 1972 to Fall 1975, has the amount of your training grant DOLLARS (including those received from participation in interdepartmental grants) increased or decreased?

1 ☐ Increased 2 ☐ Decreased 3 ☐ No Change (5)

C4. **If the number of either your predoctoral or postdoctoral TRAINEES DECLINED from 1972 to 1975 (as shown in Question C1, line 2), what attempts were made to find alternative sources of support for your continuing predoctoral students and postdoctorals?**

Possible Alternative Sources	*Predoctoral* *Successful**	*Unsuccessful*	*No Attempt*	*Postdoctoral* *Successful**	*Unsuccessful*	*No Attempt*
1. FEDERAL GOVERNMENT:						
a. research grants/contracts (new or existing)	1 ☐	2 ☐	3 ☐ (9)	1 ☐	2 ☐	3 ☐ (10)
b. other fellowships/traineeships	1 ☐	2 ☐	3 ☐ (11)	1 ☐	2 ☐	3 ☐ (12)
2. INSTITUTION/STATE:						
a. research grants/contracts (new or existing)	1 ☐	2 ☐	3 ☐ (13)	1 ☐	2 ☐	3 ☐ (14)
b. fellowships/traineeships	1 ☐	2 ☐	3 ☐ (15)	1 ☐	2 ☐	3 ☐ (16)
c. teaching assistantships	1 ☐	2 ☐	3 ☐ (17)	1 ☐	2 ☐	3 ☐ (18)
3. PRIVATE FOUNDATIONS	1 ☐	2 ☐	3 ☐ (19)	1 ☐	2 ☐	3 ☐ (20)
4. INDUSTRY	1 ☐	2 ☐	3 ☐ (21)	1 ☐	2 ☐	3 ☐ (22)
5. Other, specify: ____________	1 ☐	2 ☐	3 ☐ (23)	1 ☐	2 ☐	3 ☐ (24)

*"Successful" may include those sources which only partially redressed lost support.

C5. **If the number of BOTH your PREDOCTORAL TRAINEES and ENROLLMENTS DECLINED between Fall 1972 and Fall 1975 (as shown in Question C1), what were the primary and secondary causes of this decline in enrollments?**

	Primary (check only one)	*Secondary (check all relevant)*
1. Nonavailability of alternative sources of stipend support	1 ☐	2 ☐
2. Departmental decisions prohibiting or limiting number of self-supported students	1 ☐	2 ☐
3. Poor job market	1 ☐	2 ☐
4. Lack of qualified applicants	1 ☐	2 ☐
5. Other, specify: ____________	1 ☐	2 ☐
	(25)	(26-29)

C6. **If (as shown in Question C1) the number of your PREDOCTORAL TRAINEES supported on NIH/ADAMA/HRA training grants DECLINED between Fall 1972 and Fall 1975 while your PREDOCTORAL ENROLLMENTS remained LEVEL or INCREASED, what were the primary and secondary causes of this trend in enrollments?**

	Primary (check only one)	*Secondary (check all relevant)*
1. Availability of alternative fellowships and (non-NIH/ADAMHA/HRA) traineeships	1 ☐	2 ☐
2. Increase in research grant/contract support	1 ☐	2 ☐
3. More students who were self-supporting	1 ☐	2 ☐
4. Increase in number of qualified applicants	1 ☐	2 ☐
5. Labor market pressure for higher degree attainment	1 ☐	2 ☐
6. Manpower shortages in employment areas fed by your training fields	1 ☐	2 ☐
7. Other, specify: ____________	1 ☐	2 ☐
	(30)	(31-36)

C7. As of Fall 1976, what percent of your total faculty salaries was derived from

a) NIH/ADAMHA/HRA training grants? ______ percent (37-38)

b) NIH/ADAMHA/HRA research grants/contracts: ______ percent (39-40)

C8. In the event that training grants were eliminated and you were unable to compensate for the loss of associated faculty salary support, how many of your department's full-time equivalent faculty positions would be lost (use fractions if necessary)? ____________ (41-44)

Answer the following questions only if you have received training grant support in BOTH academic years 1972-73 and 1975-76.

C9. If you experienced a significant decline in the overall level of the INSTITUTIONAL support which your department received from training grants between 1972-73 to 1975-76, what was the impact of this decline?

C10. What would have been the impact on your department if NO training grant support had been available in 1975-76?

	C9. *Little or None*	C9. *Moderate Cutback*	C9. *Severe Curtail-ment*	C10. *Little or None*	C10. *Moderate Cutback*	C10. *Severe Curtail-ment*
1. Teaching courses	1 ☐	2 ☐	3 ☐ (45)	1 ☐	2 ☐	3 ☐ (46)
2. Teaching special seminars	1 ☐	2 ☐	3 ☐ (47)	1 ☐	2 ☐	3 ☐ (48)
3. Interdisciplinary training	1 ☐	2 ☐	3 ☐ (49)	1 ☐	2 ☐	3 ☐ (50)
4. Auxiliary research support: lab equipment/supplies, computer time, library materials, etc.	1 ☐	2 ☐	3 ☐ (51)	1 ☐	2 ☐	3 ☐ (52)
5. Academic staff support	1 ☐	2 ☐	3 ☐ (53)	1 ☐	2 ☐	3 ☐ (54)
6. Non-academic staff support	1 ☐	2 ☐	3 ☐ (55)	1 ☐	2 ☐	3 ☐ (56)
7. Travel	1 ☐	2 ☐	3 ☐ (57)	1 ☐	2 ☐	3 ☐ (58)
8. Other, specify: ____________	1 ☐	2 ☐	3 ☐ (59)	1 ☐	2 ☐	3 ☐ (60)

THANK YOU FOR YOUR COOPERATION.

FOR DEPARTMENTS OF PSYCHOLOGY ONLY

PLEASE RETURN WITH QUESTIONNAIRE

Because this study is directed toward research training, we must request additional information to distinguish RESEARCH from CLINICAL training. Please provide the following information for CLINICAL TRAINING in your department.

1. What has been the number of full-time predoctorals, postdoctorals, and faculty whose primary area of academic interest is CLINICAL PSYCHOLOGY? (Subset of Question A2.)

	Fall				
	1974	*1975*	*1976*	*(est.) 1977*	*(est.) 1981*
a. Full-time CLINICAL PSYCHOLOGY predoctoral enrollments	______(8-10)	______(11-13)	______(14-16)	______(17-19)	______(20-22)
b. Full-time CLINICAL PSYCHOLOGY postdoctorals	______(23-24)	______(25-26)	______(27-28)	______(29-30)	______(31-32)
c. Total CLINICAL PSYCHOLOGY faculty	______(33-34)	______(35-36)	______(37-38)	______(39-40)	______(41-42)
d. Full-time equivalent (FTE) CLINICAL PSYCHOLOGY faculty	______(43-44)	______(45-46)	______(47-48)	______(49-50)	______(51-52)

2. As of Fall, 1976, how many of your full-time predoctoral students were in terminal masters degree programs in CLINICAL PSYCHOLOGY? (Subset of Question A3.)______(53-55)

3. How many of your full-time predoctoral students and postdoctorals were supported on NIH/ADAMHA/HRA grants for CLINICAL TRAINING? (Subset of Question C1, line 2.)

	Fall 1972		*Fall 1975*	
	Predoc.	*Postdoc.*	*Predoc.*	*Postdoc.*
Full-time trainees	______(56-57)	______(58-59)	______(60-61)	______(62-63)

SUPPLEMENT 7 Basic Research Obligations and Training Grant/Fellowship Expenditures of Federal Agencies,[a] 1966-75 (millions of dollars)

		Fiscal year									
		1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
TOTAL	Obligations for Basic Res.	2074.0	2015.2	2103.8	2093.8	2062.3	2132.3	2410.8	2410.7	2457.2	2144.6
	T and F	465.1	622.7	502.8	504.3	525.3	546.4	524.1	458.7	534.6	465.5[b]
	TF/Basic Res. (%)	22.4	30.9	23.9	24.1	25.5	25.6	21.7	19.0	21.8	21.7
OE	Obligations for Basic Res.	5.9	5.6	6.5	7.5	7.8	6.8	3.7	63.0	0.2	0
	T and F	148.0	188.8	186.3	179.9	247.9	273.5	208.5	178.9	200.0	180.5[b]
	TF/Basic Res. (%)	2508.5	3371.4	2866.2	2398.7	3178.2	4022.1	5635.1	284.0	100000.0	
NIH	Obligations for Basic Res.	313.4	309.1	331.3	288.5	319.4	326.5	381.4	383.7	486.3	516.7
	T and F	142.3	157.0	160.6	169.4	151.6	154.0	158.8	116.1	189.5	152.9[b]
	TF/Basic Res. (%)	45.4	50.8	48.5	58.7	47.5	47.2	41.6	30.3	39.0	29.6
ADAMHA (HSMHA/NIMH)	Obligations for Basic Res.	0	39.8	39.1	56.5	60.3	63.6	75.3	52.6	53.3	66.2
	T and F	14.6	16.8	17.9	20.5	18.7	16.7	17.2	17.7	15.9	18.6[b]
	TF/Basic Res. (%)		42.2	45.8	36.3	31.0	26.3	22.8	33.7	29.8	28.1
Dept. of Justice	Obligations for Basic Res.	0	0	0	0	0	0	0	2.1	2.1	9.5
	T and F	0	0	0	0	0	0	28.6	38.2	37.6	40.9[b]
	TF/Basic Res. (%)								1819.0	1790.5	430.5
NSF	Obligations for Basic Res.	235.0	238.6	251.6	247.6	245.0	272.6	367.7	392.4	415.2	486.0
	T and F	94.6	92.7	79.0	96.5	73.5	77.4	60.4	46.4	32.5	25.2[b]
	TF/Basic Res. (%)	40.3	38.9	31.4	39.0	30.0	28.4	16.4	11.8	7.8	5.2
DOT	Obligations for Basic Res.	8.5	11.7	15.9	16.9	21.1	0.3	0.5	0.2	0.3	0.1
	T and F	0	2.0	0	0	0.1	0	0.9	2.9	2.2	2.6[b]
	TF/Basic Res. (%)	0	17.1	0	0	0.5	0	180.0	14.5	733.3	2600.0
NASA	Obligations for Basic Res.	654.4	603.5	655.6	677.8	637.0	680.3	768.1	768.5	732.6	241.9
	T and F	25.3	14.2	21.0	14.9	11.4	7.9	4.4	2.3	3.4	3.7[b]
	TF/Basic Res. (%)	3.9	2.4	3.2	2.2	1.8	1.2	0.6	0.3	0.5	1.5

Continued on next page

SUPPLEMENT 7 (continued)

		Fiscal year									
		1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
HUD	Obligations for Basic Res.	0	0	0	0	0	0	0	0	0	0
	T and F	0	0.1	0.4	0.5	0.5	0.5	16.1	18.9	0.4	11.4[b]
	TF/Basic Res. (%)										
Dept. of Interior	Obligations for Basic Res.	58.7	52.7	49.9	54.5	49.9	52.7	57.1	66.5	74.1	109.9
	T and F	0.2	0	0	0	0	0	0.5	0.2	0.2	0[b]
	TF/Basic Res. (%)	0.3	0	0	0	0	0	0.9	0.3	0.3	0
ERDA (AEC)	Obligations for Basic Res.	303.3	301.7	314.4	285.1	286.7	276.9	268.3	275.2	232.5	247.0
	T and F	3.8	4.6	5.4	7.1	7.0	5.2	1.5	0.7	0.5	2.9[b]
	TF/Basic Res. (%)	1.3	1.5	1.7	2.5	2.4	1.9	0.6	0.3	0.2	1.2
EPA (Env. Health Serv.)	Obligations for Basic Res.	0	0	20.1	17.8	5.5	6.1	6.1	9.0	9.5	17.4
	T and F	0	0	0	0	6.8	8.3	6.6	10.4	5.7	4.0[b]
	TF/Basic Res. (%)			0	0	123.6	136.1	108.2	115.6	60.0	23.0
DOD	Obligations for Basic Res.	286.4	284.3	263.5	276.5	246.7	261.5	270.3	257.8	243.9	235.5
	T and F	0	0	0	0	0	0	0	0	0	0[b]
	TF/Basic Res. (%)	0	0	0	0	0	0	0	0	0	0
Dept. of Labor	Obligations for Basic Res.	2.1	1.8	1.7	1.9	2.1	2.5	1.1	1.3	1.2	0.9
	T and F	0	0	0	0	0	0	0	0	0	0[b]
	TF/Basic Res. (%)	0	0	0	0	0	0	0	0	0	0
Dept. of Commerce	Obligations for Basic Res.	24.4	23.6	25.4	27.3	39.2	41.8	44.0	16.3	18.2	20.1
	T and F	0	0	0	0	0	0	0	0	0	3.0[b]
	TF/Basic Res. (%)	0	0	0	0	0	0	0	0	0	14.9
Other	Obligations for Basic Res.	181.9	142.8	128.8	135.9	141.6	140.7	167.2	121.9	187.8	193.4
	T and F	36.3	146.5	32.2	15.5	7.8	2.9	20.6	21.4	46.7	19.8[b]
	TF/Basic Res. (%)	20.0	102.6	25.0	11.4	5.5	2.1	12.3	17.6	24.9	10.2

[a] Does not include HRA and HSA. NIH and ADAMHA figures were supplied by the agencies. Traineeship and fellowship figures for 1966-71 were provided by Mr. Alfred Skolnik of the Social Security Administration.

[b] Preliminary figures provided by Mr. Albert Munse of the National Center for Educational Statistics.

SOURCES: NSF (1960-76), Social Security Administration (1968), and U.S. Office of Education (1974-76).

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THE 1977 REPORT

of the

COMMITTEE ON A STUDY OF NATIONAL NEEDS
FOR BIOMEDICAL AND BEHAVIORAL RESEARCH PERSONNEL

COMMISSION ON HUMAN RESOURCES

NATIONAL RESEARCH COUNCIL

Volume 2: Appendixes

National Academy of Sciences
Washington, D.C.
1977

NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the Committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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APPENDIX A

DATA FROM THE MANPOWER SURVEY OF NIH RESEARCH GRANTS, 1973-75

APP. A1 Full-time Equivalent Number of Ph.D.'s Employed on NIH Research Grants in 1973[a]

Field	Total NIH	Institute AI	AM	CA	DE	ES	EY	GM	HD	HL	LM	NS	RR
TOTAL ALL FIELDS	4181	350	520	755	140	98	138	641	395	587	6	392	159
Total basic biomedical sciences	2710	235	393	464	73	61	92	443	240	375	1	253	80
Anatomy, neuroanatomy	55	0	2	1	1	0	7	2	4	1	0	35	2
Anatomy, nec	36	0	5	0	2	2	2	0	15	5	1	3	1
Bacteriology	10	7	0	0	3	0	0	0	0	0	0	0	0
Biochemistry, enzyme/met.	448	21	106	76	8	15	13	90	34	49	0	29	7
Biochemistry, hormone/vitamin	87	0	36	20	3	1	1	4	14	4	0	0	4
Biochemistry, protein/am. acid	221	12	53	26	6	3	3	37	10	62	0	5	4
Biochemistry, nec	206	5	36	35	4	8	3	29	17	41	0	20	8
Biology, developmental	67	2	5	8	2	0	1	5	36	1	0	5	2
Biology, nec	28	1	8	4	0	0	0	2	0	3	0	5	5
Biophysics, molecular structure	94	7	18	14	2	1	1	34	2	13	0	0	2
Biophysics, nec	50	1	5	7	2	0	4	14	1	11	0	4	1
Botany	1	0	0	0	0	0	0	0	0	1	0	0	0
Cell biology, molecular	127	5	7	65	1	0	1	24	12	6	0	5	1
Cell biology, nec	85	1	5	23	4	0	4	23	12	7	0	5	1
Ecology	4	4	0	0	0	0	0	0	0	0	0	0	0
Entomology	15	12	0	0	0	3	0	0	0	0	0	0	0
Genetics, biochemical and mol.	124	22	8	16	1	0	0	65	9	1	0	2	0
Genetics, nec	55	1	1	9	0	1	0	34	4	2	0	3	0
Immunology	60	1	0	37	0	0	7	5	3	3	0	2	2
Medical, general	6	0	1	0	0	0	0	2	0	0	0	2	1
Microbial, biochemistry	36	13	7	2	4	2	0	7	1	0	0	0	0
Microbiology, nec	49	23	2	5	2	1	3	13	0	0	0	0	0
Nutrition	20	0	9	0	2	2	0	0	3	3	0	0	1
Parasitology	26	22	0	0	0	0	0	0	0	0	0	0	4
Pathology, experimental	95	11	12	13	3	5	1	2	3	30	0	7	8
Pathology, nec	9	0	0	1	1	1	0	1	1	2	0	0	2
Pharmacology	156	6	13	30	5	9	1	29	8	21	0	34	0
Physiology, cardiovas. & pul.	97	0	0	0	1	2	2	1	0	90	0	0	1
Physiology, endocrine	68	0	17	1	1	0	0	1	36	4	0	2	6
Physiology, gastrointestinal	22	0	16	0	1	0	0	1	0	2	0	0	2
Physiology, neuro. and muscular	119	1	1	0	4	0	23	4	4	5	0	75	2
Physiology, renal	9	0	7	0	0	0	0	1	0	1	0	0	0
Physiology, nec	48	4	6	2	1	4	11	2	7	3	0	5	3
Predental	2	1	0	0	1	0	0	0	0	0	0	0	0
Premedical	0	0	0	0	0	0	0	0	0	0	0	0	0
Radiation, nonclinical	21	0	2	16	0	0	0	2	0	1	0	0	0
Virology	104	50	1	37	1	0	2	3	1	0	0	3	6
Zoology	8	2	1	3	0	0	1	0	0	0	0	0	1
Other basic biomedical sciences	42	0	3	12	7	1	2	6	3	3	0	2	3
Other fields	969	70	61	153	54	33	33	128	126	140	4	100	67
Unknown	502	45	66	138	13	4	13	70	29	72	1	39	12

[a] Data represent 80.6% of all grants in the R, M, and P programs that responded to the Manpower Survey.

SOURCE: Statistics and Analysis Branch, Division of Research Grants, NIH.

APP. A2 Full-time Equivalent Number of Ph.D.'s Employed on NIH Research Grants in 1974[a]

Field	Total NIH	Institute AI	AM	CA	DE	ES	EY	GM	HD[b]	HL	LM	NS	RR
TOTAL ALL FIELDS	4970	379	644	949	151	113	167	695	454	778	10	447	183
Total basic biomedical sciences	3232	311	465	559	97	65	109	486	268	499	0	284	89
Anatomy, neuroanatomy	67	0	3	5	0	0	10	1	6	2	0	39	1
Anatomy, nec	33	0	3	4	3	1	2	2	6	10	0	1	1
Bacteriology	19	7	1	1	3	0	0	6	0	1	0	0	0
Biochemistry, enzyme/met.	496	17	112	85	10	14	8	110	32	62	0	31	15
Biochemistry, hormone/vitamin	126	3	52	18	2	0	0	0	37	8	0	3	3
Biochemistry, protein/am. acid	234	15	49	29	12	1	10	29	10	65	0	12	2
Biochemistry, nec	272	10	54	42	4	9	7	41	21	49	0	29	6
Biology, developmental	63	1	2	5	9	1	3	8	29	0	0	2	3
Biology, nec	28	0	4	7	0	4	0	1	4	2	0	2	4
Biophysics, molecular structure	110	3	14	17	2	1	1	34	2	26	0	9	1
Biophysics, nec	72	1	9	5	3	1	5	22	0	21	0	3	2
Botany	3	1	0	1	0	0	0	0	1	0	0	0	0
Cell biology, molecular	160	8	12	70	5	0	2	30	16	16	0	1	0
Cell biology, nec	93	2	8	31	0	3	7	12	9	15	0	5	1
Ecology	2	1	0	0	0	0	0	0	0	0	0	0	1
Entomology	14	13	0	0	0	1	0	0	0	0	0	0	0
Genetics, biochemical and mol.	150	24	9	20	0	1	0	81	9	2	0	3	1
Genetics, nec	73	8	1	9	1	2	0	35	10	5	0	1	1
Immunology	143	55	11	48	4	0	3	4	6	10	0	0	2
Medicak, general	5	0	3	0	0	0	0	1	0	1	0	0	0
Microbial, biochemistry	36	18	0	6	5	1	1	5	0	0	0	0	0
Microbiology, nec	63	30	2	12	8	2	3	1	2	1	0	1	1
Nutrition	22	0	10	0	2	0	0	0	2	4	0	0	4
Parasitology	30	27	0	0	0	0	0	0	0	0	0	0	3
Pathology, experimental	88	8	20	23	6	2	0	4	3	15	0	1	6
Pathology, nec	13	0	0	2	0	0	0	0	4	5	0	0	2
Pharmacology	158	2	16	20	9	10	1	38	8	30	0	23	1
Physiology, cardiovas. & pul.	131	0	1	0	0	3	2	4	1	116	0	2	2
Physiology, endocrine	68	0	24	2	0	1	0	2	27	4	0	1	7
Physiology, gastrointestinal	20	0	16	0	1	0	0	1	0	1	0	0	1
Physiology, neuro. and muscular	167	0	3	0	2	0	32	2	9	9	0	99	11
Physiology, renal	22	0	16	0	0	2	0	0	0	2	0	2	0
Physiology, nec	47	2	4	1	1	3	7	1	9	10	0	7	2
Predental	2	0	1	0	1	0	0	0	0	0	0	0	0
Premedical	0	0	0	0	0	0	0	0	0	0	0	0	0
Radiation, nonclinical	34	0	1	32	0	0	0	1	0	0	0	0	0
Virology	114	49	2	50	2	0	1	4	0	1	0	2	3
Zoology	11	3	1	0	1	0	0	0	1	0	0	3	2
Other basic biomedical sciences	43	3	1	14	1	2	4	6	4	6	0	2	0
Other fields	1031	16	77	189	48	42	41	129	131	167	6	101	84
Unknown	707	52	102	201	6	6	17	80	55	112	4	62	10

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[a] Data represent 77% of all grants in the R, M, and P programs that responded to the Manpower Survey.

[b] Includes NIA.

SOURCE: Statistics and Analysis Branch, Division of Research Grants, NIH.

APP. A3 Full-time Equivalent Number of Ph.D.'s Employed on NIH Research Grants in 1975[a]

Field	Total NIH	Institute AI	AM	CA	DE	ES	EY	GM	HD[b]	HL	LM	NS	RR
TOTAL ALL FIELDS	4257	370	517	922	138	97	137	610	371	616	15	414	120
Total basic biomedical sciences	2776	213	374	528	87	58	90	428	229	432	3	257	77
Anatomy, neuroanatomy	48	0	3	0	0	0	10	1	3	2	0	28	11
Anatomy, nec	29	0	2	0	2	1	0	2	9	8	2	1	2
Bacteriology	18	5	1	1	4	0	0	5	0	1	0	1	0
Biochemistry, enzyme/met.	389	13	87	56	15	17	12	79	24	51	0	30	5
Biochemistry, hormone/vitamin	120	3	49	31	2	1	0	1	18	13	0	0	2
Biochemistry, protein/am. acid	231	7	37	20	13	1	9	47	7	67	0	18	5
Biochemistry, nec	234	8	31	49	5	5	2	31	25	49	0	23	6
Biology, developmental	71	1	3	12	4	0	3	5	34	3	0	3	3
Biology, nec	26	0	7	11	0	0	0	1	2	0	0	0	5
Biophysics, molecular structure	76	6	12	15	2	1	0	25	1	13	0	0	1
Biophysics, nec	56	0	5	9	1	0	5	16	0	14	0	3	3
Botany	3	0	0	0	0	0	0	1	0	1	0	3	1
Cell biology, molecular	109	4	6	54	4	1	3	16	6	12	0	1	0
Cell biology, nec	100	4	6	31	3	2	5	22	8	9	0	10	0
Ecology	3	3	0	0	0	0	0	0	0	0	0	0	0
Entomology	7	4	0	0	0	1	0	0	0	1	0	0	1
Genetics, biochemical and mol.	149	17	7	21	0	1	0	85	8	4	0	5	1
Genetics, nec.	57	5	0	9	0	6	2	23	7	2	0	1	2
Immunology	142	50	10	56	6	0	0	2	6	7	0	3	2
Medical, general	3	0	2	1	0	0	0	0	0	0	0	0	0
Microbial, biochemistry	36	14	4	5	3	3	0	7	0	0	0	0	0
Microbiology, nec	41	20	3	6	3	0	1	2	2	2	0	0	2
Nutrition	15	0	5	0	2	0	0	0	3	3	0	0	2
Parasitology	15	12	0	0	0	0	0	0	0	0	0	0	3
Pathology, experimental	60	4	8	15	3	4	0	3	3	15	0	2	3
Pathology, nec	11	0	0	3	0	0	1	1	1	2	0	0	3
Pharmacology	148	1	22	29	8	3	2	38	4	19	1	21	0
Physiology, cardiovas. & pul.	101	0	1	0	0	0	0	0	1	96	0	1	2
Physiology, endocrine	75	0	26	1	0	0	0	0	34	4	0	1	9
Physiology, gastrointestinal	23	0	17	1	1	0	0	2	0	2	0	0	0
Physiology, neuro. and muscular	144	0	1	1	2	1	20	3	6	9	0	97	4
Physiology, renal	15	0	7	0	0	3	0	0	0	4	0	1	0
Physiology, nec	57	0	8	1	1	4	11	2	13	11	0	3	3
Predental	0	0	0	0	0	0	0	0	0	0	0	0	0
Premedical	0	0	0	0	0	0	0	0	0	0	0	0	0
Radiation, nonclinical	22	0	1	20	0	0	0	1	0	0	0	0	0
Virology	102	32	2	57	1	0	1	3	0	2	0	1	3
Zoology	6	0	0	0	1	0	0	1	2	0	0	0	2
Other basic biomedical sciences	34	0	1	13	1	3	3	1	2	6	0	3	1
Other fields	910	14	68	202	44	31	31	122	93	131	12	100	32
Unknown	571	43	75	192	7	8	16	60	49	53	0	57	11

[a] Data represent 69.8% of all grants in the R, M, and P programs that responded to the Manpower Survey.

[b] Includes NIA.

SOURCE: Statistics and Analysis Branch, Division of Research Grants, NIH.

APP. A4 Full-time Equivalent Number of Professional Doctorates Employed on NIH Research Grants in 1973[a]

	Total NIH	Institute											
		AI	AM	CA	DE	ES	EY	GM	HD	HL	LM	NS	RR
TOTAL ALL FIELDS	1456	91	246	273	41	10	56	62	81	328	3	155	110
Total internal medicine	330	23	83	33	0	0	0	2	5	133	0	6	45
Allergy	2	1	0	0	0	0	0	0	0	1	0	0	0
Cardiovascular diseases	80	0	0	0	0	0	0	0	0	79	0	0	1
Endocrinology	49	1	23	4	0	0	0	0	3	5	0	2	11
Gastroenterology	20	1	13	1	0	0	0	0	0	1	0	0	4
Hematology	68	4	17	21	0	0	0	1	0	22	0	0	3
Immunology	13	3	4	2	0	0	0	0	2	1	0	0	1
Infectious diseases	14	12	0	1	0	0	0	0	0	1	0	0	0
Internal medicine, general	16	1	2	0	0	0	0	1	0	5	0	4	3
Metabolism	27	0	10	0	0	0	0	0	0	4	0	0	13
Pulmonary diseases	11	0	0	0	0	0	0	0	0	11	0	0	0
Renal diseases	20	0	9	1	0	0	0	0	0	2	0	0	8
Other internal medicine	10	0	5	3	0	0	0	0	0	1	0	0	1
Total clinical medicine	288	1	18	93	1	1	22	19	23	46	1	45	18
Anesthesiology	9	0	0	0	0	0	0	6	0	1	0	2	0
Chemotherapy, cancer	30	0	0	30	0	0	0	0	0	0	0	0	0
Chemotherapy, other	0	0	0	0	0	0	0	0	0	0	0	0	0
Dermatology	8	0	6	2	0	0	0	0	0	0	0	0	0
Neurology	35	0	0	0	0	0	0	0	2	3	0	30	0
Nuclear medicine	3	0	0	1	0	0	0	2	0	0	0	0	0
Obstetrics and gynecology	12	0	0	3	0	0	0	0	4	3	0	0	2
Oncology	31	0	0	30	0	0	1	0	0	0	0	0	0
Ophthalmology	25	0	0	2	0	0	21	0	0	1	1	0	0
Osteopathy	1	0	0	0	0	0	0	0	0	1	0	0	0
Otorhinolaryngology	6	0	0	0	1	0	0	0	0	1	0	4	0
Pediatrics, cardiology	4	0	0	0	0	0	0	0	0	3	0	0	1
Pediatrics, nec	49	0	5	2	0	0	0	0	17	11	0	3	11
Pharmacology, clinical	9	0	1	3	0	0	0	4	0	1	0	0	0
Physical medicine, rehabilitation	0	0	0	0	0	0	0	0	0	0	0	0	0
Preventive medicine, public health	2	0	0	0	0	0	0	0	0	1	0	0	0
Psychiatry	3	0	0	1	0	0	0	0	0	1	0	1	0
Radiology, diagnostic	2	0	0	0	0	0	0	1	0	0	0	0	1
Radiology, therapeutic	9	0	0	9	0	0	0	0	0	0	0	0	0
Radiology, nec	3	0	0	1	0	0	0	0	0	2	0	0	0
Surgery, cardiovascular	8	0	0	0	0	0	0	1	0	7	0	0	0
Surgery, general	15	0	3	3	0	0	0	4	0	4	0	0	1
Surgery, neurological	6	0	0	2	0	0	0	0	0	0	0	4	0
Surgery, orthopedic	2	0	2	0	0	0	0	0	0	0	0	0	0
Surgery, plastic	1	0	0	0	0	0	0	0	0	0	0	1	0
Surgery, thoracic	5	0	0	0	0	0	0	0	0	5	0	0	0
Surgery, nec	1	0	0	0	0	0	0	0	0	0	0	0	1
Tropical medicine	1	1	0	0	0	0	0	0	0	0	0	0	0
Urology	6	0	1	3	0	0	0	0	0	1	0	0	1
Other clinical medicine	2	0	0	1	0	0	0	1	0	0	0	0	0
Total dental sciences	23	0	0	0	23	0	0	0	0	0	0	0	0
Dentistry, cleft palate	3	0	0	0	3	0	0	0	0	0	0	0	0
Dentistry, oral pathology	0	0	0	0	0	0	0	0	0	0	0	0	0
Dentistry, oral surgery	2	0	0	0	2	0	0	0	0	0	0	0	0
Dentistry, periodontia	3	0	0	0	3	0	0	0	0	0	0	0	0
Dentistry, general	1	0	0	0	1	0	0	0	0	0	0	0	0
Other dental specialties	14	0	0	0	14	0	0	0	0	0	0	0	0
Basic biomedical sciences	548	58	108	78	12	5	23	29	37	108	0	75	15
Behavioral sciences	2	0	0	0	0	0	0	0	1	0	0	1	0
Other health related sciences	54	2	5	8	2	1	3	2	6	4	0	1	20
Environmental sciences	7	0	0	1	0	3	1	1	0	1	0	0	0
Mathematical sciences	5	0	0	1	0	0	0	0	0	0	0	0	4
Physical sciences	1	0	0	1	0	0	0	0	0	0	0	0	0
Other fields	7	0	0	1	0	0	0	1	0	3	1	1	0
Unknown	191	7	32	57	3	0	7	8	9	33	1	26	8

[a] Data represent 80.6% of all grants in the P, M, and P programs that responded to the Manpower Survey. Does not include nonpaid personnel. Professional doctorates include M.D.'s, D.D.S.'s, D.V.M.'s, etc.

SOURCE: Statistics and Analysis Branch, Division of Research Grants, NIH.

APP. A5 Full-time Equivalent Number of Professional Doctorates Employed on NIH Research Grants in 1974[a]

	Total NIH	Institute AI	AM	CA	DE	ES	EY	GM	HD[b]	HL	LM	NS	RR
TOTAL ALL FIELDS	1624	89	261	351	54	10	54	53	90	388	3	158	113
Total internal medicine	343	19	85	40	0	1	0	1	5	149	0	3	40
Allergy	4	3	0	0	0	0	0	0	0	1	0	0	0
Cardiovascular diseases	84	0	0	0	0	0	0	0	0	84	0	0	0
Endocrinology	48	0	24	2	0	0	0	0	1	4	0	1	16
Gastroenterology	29	1	14	11	0	0	0	0	0	1	0	0	2
Hematology	57	0	12	17	0	1	0	0	1	22	0	1	3
Immunology	25	9	6	5	0	0	0	0	0	3	0	0	2
Infectious diseases	7	4	0	2	0	0	0	0	0	1	0	0	0
Internal medicine, general	14	0	1	2	0	0	0	1	1	3	0	1	5
Metabolism	22	0	12	0	0	0	0	0	2	2	0	0	6
Pulmonary diseases	16	0	0	0	0	0	0	0	0	16	0	0	0
Renal diseases	32	2	13	0	0	0	0	0	0	11	0	0	6
Other internal medicine	5	0	3	1	0	0	0	0	0	1	0	0	0
Total clinical medicine	363	1	26	128	3	2	26	11	30	61	1	52	22
Anesthesiology	7	0	0	0	0	0	0	4	0	2	0	1	0
Chemotherapy, cancer	29	0	0	29	0	0	0	0	0	0	0	0	0
Chemotherapy, other	0	0	0	0	0	0	0	0	0	0	0	0	0
Dermatology	14	0	8	5	0	1	0	0	0	0	0	0	0
Neurology	45	0	1	0	0	0	0	0	3	4	0	37	0
Nuclear medicine	1	0	0	1	0	0	0	0	0	0	0	0	0
Obstetrics and gynecology	5	0	0	2	0	0	0	0	3	0	0	0	0
Oncology	45	0	0	45	0	0	0	0	0	0	0	0	0
Ophthalmology	28	0	0	1	0	0	26	0	0	0	1	0	0
Osteopathy	0	0	0	0	0	0	0	0	0	0	0	0	0
Otorhinolaryngology	5	0	0	0	2	0	0	0	0	1	0	2	0
Pediatrics, cardiology	11	0	0	0	0	0	0	0	0	11	0	0	0
Pediatrics, nec	77	1	10	8	0	1	0	0	22	18	0	2	15
Pharmacology, clinical	6	0	0	0	0	0	0	3	0	3	0	0	0
Physical medicine, rehabilitation	0	0	0	0	0	0	0	0	0	0	0	0	0
Preventive medicine, public health	1	0	0	0	0	0	0	0	0	1	0	0	0
Psychiatry	5	0	0	2	0	0	0	0	0	0	0	1	2
Radiology, diagnostic	10	0	0	2	1	0	0	1	0	3	0	2	1
Radiology, therapeutic	16	0	0	16	0	0	0	0	0	0	0	0	0
Radiology, nec	4	0	0	3	0	0	0	0	0	1	0	0	0
Surgery, cardiovascular	10	0	0	0	0	0	0	0	1	9	0	0	0
Surgery, general	17	0	5	6	0	0	0	2	0	2	0	0	2
Surgery, neurological	9	0	0	2	0	0	0	0	0	0	0	7	0
Surgery, orthopedic	3	0	2	0	0	0	0	0	1	0	0	0	0
Surgery, plastic	0	0	0	0	0	0	0	0	0	0	0	0	0
Surgery, thoracic	6	0	0	0	0	0	0	1	0	5	0	0	0
Surgery, nec	2	0	0	1	0	0	0	0	0	0	0	0	1
Tropical medicine	0	0	0	0	0	0	0	0	0	0	0	0	0
Urology	5	0	0	5	0	0	0	0	0	0	0	0	0
Other clinical medicine	2	0	0	0	0	0	0	0	0	1	0	0	1
Total dental sciences	31	1	0	0	28	0	0	1	1	0	0	0	0
Dentistry, cleft palate	1	0	0	0	1	0	0	0	0	0	0	0	0
Dentistry, oral pathology	0	0	0	0	0	0	0	0	0	0	0	0	0
Dentistry, oral surgery	0	0	0	0	0	0	0	0	0	0	0	0	0
Dentistry, periodontia	4	0	0	0	4	0	0	0	0	0	0	0	0
Dentistry, general	5	1	0	0	2	0	0	1	1	0	0	0	0
Other dental specialties	21	0	0	0	21	0	0	0	0	0	0	0	0
Basic biomedical sciences	570	50	99	102	13	3	19	30	38	128	0	66	22
Behavioral sciences	3	0	2	0	0	0	0	0	1	0	0	0	0
Other health related sciences	61	1	5	9	6	0	4	0	5	9	0	2	20
Environmental sciences	3	0	0	0	0	1	0	1	0	1	0	0	0
Mathematical sciences	6	0	0	2	1	0	0	2	0	0	0	0	1
Physical sciences	4	0	0	2	0	0	0	0	0	2	0	0	0
Other fields	5	0	0	1	0	0	0	0	0	1	2	1	0
Unknown	235	17	44	67	3	3	5	7	10	37	0	34	8

[a] Data represent 77% of all grants in the R, M, and P programs that responded to the Manpower Survey. Does not include nonpaid personnel. Professional doctorates include M.D.'s, D.D.S.'s, D.V.M.'s, etc.

[b] Includes NIA.

SOURCE: Statistics and Analysis Branch, Division of Research Grants, NIH.

APP. A6 Full-time Equivalent Number of Professional Doctorates Employed on NIH Research Grants in 1975[a]

	Total NIH	Institute											
		AI	AM	CA	DE	ES	EY	GM	HD[b]	HL	LM	NS	RR
TOTAL ALL FIELDS	1380	70	213	310	34	16	46	53	90	317	2	127	102
Total internal medicine	290	17	57	40	0	1	0	2	10	129	0	2	32
Allergy	5	5	0	0	0	0	0	0	0	0	0	0	0
Cardiovascular diseases	68	0	0	0	0.	0	0	0	0	68	0	0	0
Endocrinology	41	0	11	3	0	0	0	1	4	4	0	1	17
Gastroenterology	18	0	10	5	0	0	0	0	1	1	0	0	1
Hematology	50	1	5	23	0	0	0	0	0	19	0	1	1
Immunology	12	3	5	1	0	0	0	0	0	3	0	0	0
Infectious diseases	13	7	1	3	0	0	0	0	1	0	0	0	1
Internal medicine, general	11	0	1	1	0	0	0	0	0	7	0	0	2
Metabolism	29	0	15	0	0	1	0	0	4	4	0	0	5
Pulmonary diseases	15	0	0	0	0	0	0	0	0	15	0	0	0
Renal diseases	19	1	8	1	0	0	0	0	0	6	0	0	3
Other internal medicine	9	0	1	3	0	0	0	1	0	2	0	0	2
Total clinical medicine	316	1	21	122	2	4	23	14	27	42	0	52	8
Anesthesiology	8	0	0	0	0	0	0	4	0	2	0	2	0
Chemotherapy, cancer	23	0	0	23	0	0	0	0	0	0	0	0	0
Chemotherapy, other	0	0	0	0	0	0	0	0	0	0	0	0	0
Dermatology	15	0	10	4	0	1	0	0	0	0	0	0	0
Neurology	38	0	0	0	0	2	0	0	1	2	0	33	0
Nuclear medicine	2	0	0	2	0	0	0	0	0	0	0	0	0
Obstetrics and gynecology	4	0	0	1	0	0	0	0	3	0	0	0	0
Oncology	46	0	0	45	0	0	0	0	0	0	0	0	1
Ophthalmology	27	0	0	2	0	0	22	0	0	0	0	3	0
Osteopathy	0	0	0	0	0	0	0	0	0	0	0	0	0
Otorhinolaryngology	4	0	0	0	2	0	0	0	1	0	0	1	0
Pediatrics, cardiology	7	0	0	0	0	0	0	0	1	6	0	0	0
Pediatrics, nec	58	1	4	4	0	0	1	2	20	20	0	0	6
Pharmacology, clinical	9	0	0	1	0	0	0	5	0	1	0	2	0
Physical medicine, rehabilitation	0	0	0	0	0	0	0	0	0	0	0	0	0
Preventive medicine, public health	3	0	0	3	0	0	0	0	0	0	0	0	0
Psychiatry	1	0	0	0	0	0	0	0	1	0	0	0	0
Radiology, diagnostic	8	0	0	3	0	0	0	1	0	3	0	1	0
Radiology, therapeutic	20	0	0	20	0	0	0	0	0	0	0	0	0
Radiology, nec	4	0	1	1	0	0	0	0	0	2	0	0	0
Surgery, cardiovascular	5	0	0	1	0	0	0	0	0	4	0	0	0
Surgery, general	10	0	2	6	0	0	0	1	0	1	0	0	0
Surgery, neurological	11	0	0	1	0	0	0	0	0	0	0	10	0
Surgery, orthopedic	2	0	2	0	0	0	0	0	0	0	0	0	0
Surgery, plastic	1	0	1	0	0	0	0	0	0	0	0	0	0
Surgery, thoracic	1	0	0	0	0	0	0	0	0	1	0	0	0
Surgery, nec	3	0	0	2	0	0	0	0	0	0	0	0	1
Tropical medicine	1	0	0	1	0	0	0	0	0	0	0	0	0
Urology	2	0	1	1	0	0	0	0	0	0	0	0	0
Other clinical medicine	3	0	0	1	0	1	0	1	0	0	0	0	0
Total dental sciences	31	0	0	4	22	1	1	0	1	0	0	2	0
Dentistry, cleft palate	2	0	0	0	1	0	1	0	0	0	0	0	0
Dentistry, oral pathology	2	0	0	1	1	0	0	0	0	0	0	0	0
Dentistry, oral surgery	4	0	0	0	2	0	0	0	0	0	0	2	0
Dentistry, periodontia	4	0	0	0	4	0	0	0	0	0	0	0	0
Dentistry, general	6	0	0	1	3	1	0	0	1	0	0	0	0
Other dental specialties	13	0	0	2	11	0	0	0	0	0	0	0	0
Basic biomedical sciences	482	36	87	84	8	5	16	27	38	110	0	50	21
Behavioral sciences	0	0	0	0	0	0	0	0	0	0	0	0	0
Other health related sciences	42	1	0	7	0	0	1	1	1	6	0	0	25
Environmental sciences	3	0	0	1	0	2	0	0	0	0	0	0	0
Mathematical sciences	7	0	0	1	1	0	0	0	0	1	0	2	2
Physical sciences	4	0	1	0	0	1	0	0	0	1	0	1	0
Other fields	4	0	0	3	0	0	0	0	0	1	0	0	0
Unknown	201	15	47	48	1	2	5	9	13	27	2	18	14

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[a] Data represent 69.8% of all grants in the R, M, and P programs that responded to Manpower Survey. Does not include nonpaid personnel. Professional doctorates include M.D.'s, D.D.S.'s, D.V.M.'s, etc.

[b] Includes NIA.

SOURCE: Statistics and Analysis Branch, Division of Research Grants, NIH.

PP. A7 Percentage Distribution of Total Manweeks on NIH Research Grants According to Pay Status, thin Occupational Category and Institute, FY 1973[a]

arding nstitute	Faculty Status			Nonfaculty (Prof.)			In Training		
	Total	Paid	Unpaid	Total	Paid	Unpaid	Total	Paid	Unpaid
OTAL	100.0	55.1	44.9	100.0	76.8	23.2	100.0	44.6	55.4
AI	100.0	43.6	56.4	100.0	81.1	18.9	100.0	38.6	61.4
AM	100.0	51.8	48.2	100.0	80.0	20.0	100.0	42.9	57.1
CA	100.0	56.8	43.2	100.0	80.4	19.6	100.0	48.2	51.8
DE	100.0	47.5	52.5	100.0	87.9	12.1	100.0	52.4	47.6
ES	100.0	69.9	30.1	100.0	89.9	10.1	100.0	61.9	38.1
EY	100.0	63.6	36.4	100.0	46.3	53.7	100.0	40.3	59.7
GM	100.0	55.2	44.8	100.0	83.7	16.3	100.0	50.1	49.9
HD	100.0	52.1	47.9	100.0	79.8	20.2	100.0	41.6	58.4
HL	100.0	58.7	41.3	100.0	83.6	16.4	100.0	40.3	59.7
LM	100.0	61.8	38.2	100.0	86.3	13.7	100.0	76.1	23.9
NS	100.0	59.4	40.6	100.0	82.3	17.7	100.0	40.7	59.3
RR	100.0	60.7	39.3	100.0	53.3	46.7	100.0	43.2	56.8

Unpublished data from Statistics and Analysis Branch, Division of Research Grants, NIH. Figures exclude General Research Support, foreign, chairman, and conference grants. Paid manweeks = wks x hrs (hrs cut to max of 60) ÷ 40. Unpaid manweeks = manweeks reported unpaid plus paid employment in excess of 60 hours per week.

APP. A8 NIH Research Grant Expenditures on Grants Responding to the Manpower Survey FY 1973-75[a]
(millions of current dollars)

	1973			1974			1975		
Institute	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect
GRAND TOTAL	637.9	490.9	147.0	767.5	579.0	188.5	755.5	563.4	192.1
AI	50.2	37.8	12.4	51.2	37.4	13.8	49.4	36.3	13.1
AM	74.9	55.6	19.3	95.4	70.5	24.9	85.1	62.5	22.6
CA	124.5	96.0	28.5	163.9	124.4	39.5	172.3	129.0	43.3
DE	16.4	12.1	4.3	21.3	15.5	5.8	19.8	14.5	5.3
ES	10.4	7.8	2.6	13.8	10.2	3.6	13.8	10.0	3.8
EY	18.5	13.6	4.9	22.0	16.0	6.0	21.8	15.9	5.9
GM	77.0	57.3	19.7	86.4	63.4	23.0	94.1	70.2	23.9
HD	48.1	35.8	12.3	63.5	46.7	16.8	60.0	43.6	16.4
HL	115.2	88.6	26.6	136.1	101.3	34.8	131.5	96.3	35.2
LM	0.6	0.5	0.1	1.0	0.8	0.2	1.5	1.1	0.4
NS	47.4	35.3	12.1	56.5	41.8	14.7	60.5	44.1	16.4
RR	54.5	50.4	4.1	55.9	50.9	5.0	45.6	39.9	5.7

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[a] Unpublished data from Statistics and Analysis Branch, Division of Research Grants, NIH.

APP. A9 Manpower Coefficients by Institute, Academic Level, and Broad Field[a] (manyears per million dollars of research grant expenditures in each institute)

			Institute											
FDS Group	Academic Level[c]	Total NIH	AI	AM	CA	DE	ES	EY	GM	HD[b]	HL	LM	NS	RR
TOTAL ALL FIELDS	Total	22.44	24.85	24.22	18.11	27.39	20.90	29.14	19.72	24.50	19.13	33.80	23.92	22.52
	Doctorate: Ph.D.	10.69	13.07	11.55	9.60	14.29	11.80	12.96	12.37	12.90	8.48	16.66	12.67	5.84
	M.D.	3.75	3.55	5.49	3.57	4.14	1.42	4.53	1.16	2.94	4.59	3.18	4.65	3.77
	Other professional	8.00	8.23	7.18	4.94	8.96	7.68	11.65	6.19	8.66	6.06	13.96	6.60	12.91
Basic biomedical sciences	Total	13.92	22.12	18.02	11.23	16.37	13.37	19.28	14.98	15.26	11.45	2.95	15.62	5.55
	Doctorate: Ph.D.	8.12	12.35	9.92	7.13	9.83	7.39	9.57	9.69	8.67	6.34	2.42	9.16	3.13
	M.D.	1.58	2.37	2.72	1.23	1.16	0.58	1.93	0.71	1.42	1.69	0	2.41	0.74
	Other professional	4.22	7.40	5.38	2.87	5.38	5.40	7.78	4.58	5.17	3.42	0.53	4.05	1.66
Internal medicine	Total	1.52	1.63	3.74	0.84	0.05	0.11	0	0.12	0.45	3.12	0	0.24	2.22
	Doctorate: Ph.D.	0.26	0.25	0.69	0.15	0	0	0	0.03	0.04	0.54	0	0.06	0.24
	M.D.	0.94	1.05	2.10	0.53	0	0.11	0	0.04	0.27	2.04	0	0.14	1.46
	Other professional	0.32	0.33	0.95	0.16	0.05	0	0	0.05	0.14	0.54	0	0.04	0.52
Clinical medicine	Total	1.66	0.27	1.07	2.80	0.22	0.55	4.71	0.97	1.61	1.14	1.39	3.28	1.01
	Doctorate: Ph.D.	0.41	0.07	0.20	0.77	0.04	0.09	1.06	0.28	0.32	0.27	0	0.80	0.21
	M.D.	0.94	0.06	0.58	1.62	0.16	0.34	2.28	0.35	1.06	0.72	1.39	1.96	0.60
	Other professional	0.31	0.14	0.29	0.41	0.02	0.12	1.37	0.34	0.23	0.15	0	0.52	0.20
Dentistry	Total	0.15	0.02	0.01	0.03	4.87	0.15	0.03	0.02	0.06	0	0	0.04	0
	Doctorate: Ph.D.	0.04	0	0.01	0.01	1.22	0	0	0	0	0	0	0.01	0
	M.D.	0.08	0.02	0	0.02	2.52	0.05	0.03	0.01	0.03	0	0	0.02	0
	Other professional	0.03	0	0	0	1.13	0.10	0	0.01	0.03	0	0	0.01	0
Behavioral sciences	Total	0.71	0.09	0.10	0.04	0.80	0.51	1.61	0.11	4.69	0.16	3.15	2.20	0.29
	Doctorate: Ph.D.	0.50	0.03	0.08	0.03	0.50	0.51	1.26	0.10	3.10	0.12	2.41	1.67	0.18
	M.D.	0.01	0	0.02	0	0	0	0	0	0.02	0	0	0.01	0
	Other professional	0.20	0.06	0	0.01	0.30	0	0.35	0.01	1.57	0.04	0.74	0.53	0.11
Other health fields	Total	1.26	0.25	0.28	0.92	1.31	0.22	0.38	0.28	0.94	0.70	0	0.76	9.29
	Doctorate: Ph.D.	0.16	0.07	0.03	0.17	0.56	0.04	0.03	0.06	0.19	0.12	0	0.29	0.52
	M.D.	0.15	0.05	0.06	0.11	0.22	0.03	0.26	0.02	0.14	0.09	0	0.04	0.88
	Other professional	0.95	0.13	0.19	0.64	0.53	0.15	0.09	0.20	0.61	0.49	0	0.43	7.89
Environmental sciences	Total	0.54	0.03	0.26	0.23	0.73	2.99	1.26	0.75	0.09	0.79	0	0.74	0.70
	Doctorate: Ph.D.	0.24	0.03	0.15	0.15	0.49	2.04	0.27	0.38	0.03	0.31	0	0.29	0.15
	M.D.	0.01	0	0	0.01	0	0.26	0.03	0.01	0	0.01	0	0	0
	Other professional	0.29	0	0.11	0.07	0.24	0.69	0.96	0.36	0.06	0.47	0	0.45	0.55
Mathematical sciences	Total	0.81	0.02	0.07	0.58	0.70	0.50	0.45	0.70	0.54	0.87	5.55	0.59	4.19
	Doctorate: Ph.D.	0.26	0	0.02	0.21	0.23	0.42	0.11	0.34	0.21	0.34	2.59	0.17	0.93
	M.D.	0.02	0	0	0.02	0.08	0	0	0.01	0	0.00	0	0.03	0.04
	Other professional	0.53	0.02	0.05	0.35	0.39	0.08	0.34	0.35	0.33	0.53	2.96	0.39	3.20
Physical sciences	Total	0.89	0.38	0.64	1.20	2.16	2.07	0.81	1.67	0.25	0.61	0	0.40	0.80
	Doctorate: Ph.D.	0.64	0.27	0.44	0.93	1.38	1.14	0.57	1.45	0.18	0.38	0	0.20	0.48
	M.D.	0.01	0	0.01	0.01	0	0.05	0	0	0	0.02	0	0.01	0
	Other professional	0.24	0.11	0.19	0.26	0.78	0.88	0.24	0.22	0.07	0.21	0	0.19	0.32
Other fields	Total	0.28	0.04	0.03	0.24	0.18	0.43	0.61	0.12	0.61	0.29	20.76	0.29	0.45
	Doctorate: Ph.D.	0.06	0	0.01	0.05	0.04	0.17	0.09	0.04	0.16	0.06	9.24	0.02	0.03
	M.D.	0.01	0	0	0.02	0	0	0	0.01	0	0.02	1.79	0.03	0
	Other professional	0.21	0.04	0.02	0.17	0.14	0.26	0.52	0.07	0.45	0.21	9.73	0.24	0.42

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[a] Coefficients were derived by pooling the responses from the 1973-75 Manpower Surveys, adjusting for non-paid personnel and unknown FDS codes, and dividing by pooled research grant expenditures within each institute. The R and D cost index used which was developed by NSF was 1.06 for 1974 and 1.16 for 1975 (1973=100).

[b] Includes NIA.

[c] Ph.D. means all academic doctorates (D.Sc., D.Ph., etc.); M.D. means all professional doctorates (D.D.S., D.V.M., etc.)

SOURCE: Statistics and Analysis Branch, Division of Research Grants, NIH; Appendixes A1-A8.

APP. A10 Percent Distribution of Manpower Coefficients within Each Institute (Ph.D.'s only)[a]

		Institute											
FOS Group	Total NIH	AI	AM	CA	DE	ES	EY	GM	HD[b]	HL	LM	NS	RR
TOTAL ALL FIELDS	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Basic biomedical sciences	75.96	94.49	85.89	74.27	68.79	62.63	73.84	78.33	67.21	74.76	14.53	72.30	53.60
Internal medicine	2.43	1.91	5.97	1.56	0	0	0	0.24	0.31	6.37	0	0.47	4.11
Clinical medicine	3.84	0.54	1.73	8.02	0.28	0.76	8.18	2.26	2.48	3.18	0	6.31	3.60
Dentistry	0.37	0	0.09	0.11	8.54	0	0	0	0	0	0	0.08	0
Behavioral science	4.68	0.23	0.69	0.31	3.50	4.32	9.72	0.81	24.03	1.42	14.46	13.18	3.08
Other health fields	1.50	0.54	0.26	1.77	3.92	0.34	0.23	0.49	1.47	1.42	0	2.29	8.90
Environmental sciences	2.24	0.23	1.30	1.56	3.43	17.29	2.08	3.07	0.23	3.66	0	2.29	2.57
Mathematical sciences	2.43	0	0.17	2.19	1.61	3.56	0.85	2.75	1.63	4.01	15.55	1.34	15.41
Physical sciences	5.99	2.06	3.81	9.69	9.66	9.66	4.40	11.72	1.40	4.48	0	1.58	8.22
Other fields	0.56	0	0.09	0.52	0.27	1.44	0.70	0.33	1.24	0.70	55.46	0.16	0.51

[a] Derived from Appendix A9.

[b] Includes NIA.

APP. All   Percent Distribution of Manpower Coefficients within Each Institute (professional doctorates only)[a]

FDS Group	Total NIH	Institute AI	AM	CA	DE	ES	EY	GM	HD[b]	HL	LM	NS	RR
TOTAL ALL FIELDS	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0
Basic biomedical sciences	42.13	66.76	49.55	34.45	28.02	40.85	42.61	61.21	48.30	36.82	0	51.83	19.6
Internal medicine	25.07	29.58	38.25	14.85	0	7.75	0	3.45	9.18	44.45	0	38.73	38.7
Clinical medicine	25.06	1.69	10.57	45.38	3.86	23.94	50.33	30.17	36.06	15.69	43.71	42.15	15.9
Dentistry	2.13	0.56	0	0.56	60.87	3.52	0.66	0.86	1.02	0	0	0.43	0
Behavioral sciences	0.27	0	0.36	0	0	0	0	0	0.68	0	0	0.2	0
Other health fields	4.00	1.41	1.09	3.08	5.32	2.11	5.74	1.73	4.76	1.96	0	0.86	23.3
Environmental sciences	0.27	0	0	0.28	0	18.31	0.66	0.86	0	0.22	0	0	0
Mathematical sciences	0.53	0	0	0.56	1.93	0	0	0.86	0	0	0	0.64	2.3
Physical sciences	0.27	0	0.18	0.28	0	3.52	0	0	0	0.43	0	0.22	0
Other fields	0.27	0	0	0.56	0	0	0	0.86	0	0.43	56.29	0.64	0

[a] Derived from Appendix 9. Professional doctorates include M.D.'s, D.D.S.'s, D.V.M.'s, etc.

[b] Includes NIA.

APP. A12 Percent Changes in Manpower Coefficients from 1973 to 1974[a]

FOS Group	Academic Level[c]		Total NIH	Institutes											
				AI	AM	CA	DE	ES	EY	GM	HD[b]	HL	LM	NS	RR
TOTAL ALL FIELDS	Total		-1.6	0.5	-7.7	-1.5	-4.9	3.3	-4.2	-1.6	-12.1	7.7	-11.1	2.3	7.5
	Doctorate:	Ph.D.	4.3	0.8	3.7	1.5	-5.9	-0.6	6.7	1.2	-9.0	10.5	23.7	1.9	10.1
		M.D.	-2.2	-0.1	-12.3	2.7	6.4	-16.5	-14.0	-17.9	-7.8	5.6	-35.5	-0.4	5.3
	Other professional		-9.1	-10.9	-20.0	-9.5	-8.6	29.3	-11.3	-4.1	-17.7	-3.8	-25.0	-5.3	4.3
Basic biomedical sciences	Total		-0.6	2.7	-8.0	-3.5	-4.8	-2.8	-3.8	0.5	-9.1	12.9	-49.0	-1.0	18.9
	Doctorate:	Ph.D.	4.7	10.2	0.2	0.6	3.5	-14.2	4.1	3.7	-6.1	22.3	-100.0	4.6	11.6
		M.D.	-5.7	3.8	-17.4	3.3	-16.7	-31.6	-28.1	3.7	-15.2	4.0	0	-18.2	49.9
	Other professional		-8.0	-8.7	-16.5	-14.9	-14.7	20.1	-6.0	-6.6	-12.2	2.1	*	-0.5	22.5
Internal medicine	Total		-6.4	-17.3	-2.8	18.6	-100.0	*	0	-33.8	14.7	-9.0	0	-16.2	-12.9
	Doctorate:	Ph.D.	20.9	6.4	72.4	268.0	0	0	0	*	3.6	-18.5	0	92.4	-45.6
		M.D.	-9.2	-13.7	-12.2	-6.3	0	*	0	-49.6	-15.1	-1.8	0	-51.0	-10.0
	Other professional		-16.1	-41.3	-17.3	12.7	-100.0	0	0	-67.6	72.7	-26.1	0	127.5	-0.9
Clinical medicine	Total		7.9	19.4	-29.1	8.3	-35.0	122.6	-3.5	-2.5	19.7	19.2	-52.5	9.4	13.1
	Doctorate:	Ph.D.	4.5	0.8	-58.7	4.8	-100.0	-100.0	50.4	-7.8	71.7	14.4	0	35.7	-56.0
		M.D.	10.5	10.1	10.8	5.9	152.4	128.0	0.6	-47.5	5.4	24.3	-52.5	13.2	24.9
	Other professional		4.9	27.9	-48.0	27.7	-100.0	*	-35.9	116.3	35.6	6.6	0	-23.3	131.2
Dentistry	Total		37.9	*	*	0	13.9	0	0	*	*	0	0	0	0
	Doctorate:	Ph.D.	60.1	0	*	0	40.6	0	0	0	0	0	0	0	0
		M.D.	20.7	*	0	0	-0.9	0	0	*	*	0	0	0	0
	Other professional		66.1	0	0	0	30.1	0	0	*	*	0	0	0	0
Behavioral sciences	Total		-15.0	-71.4	*	-29.9	72.8	-19.7	3.0	-53.8	-30.6	24.7	-44.4	-21.0	143.1
	Doctorate:	Ph.D.	-6.4	-100.0	*	-40.2	36.4	-19.7	-17.5	-53.8	-20.0	43.5	59.2	-14.9	68.4
		M.D.	48.2	0	*	0	0	0	0	0	13.9	0	0	-100.0	0
	Other professional		-34.1	-45.2	0	-14.5	175.8	0	-39.3	0	-49.0	-9.5	-100.0	-33.1	296.6
Other health fields	Total		-4.7	-80.8	-0.3	-6.3	-14.4	-34.6	-48.9	5.0	-27.7	36.2	0	-29.3	10.9
	Doctorate:	Ph.D.	-9.6	-100.0	45.3	-9.1	-48.8	0	0	109.6	-60.7	91.0	0	-23.1	39.7
		M.D.	2.8	-3.6	-18.4	-6.1	214.4	-100.0	12.2	-100.0	-28.3	96.2	0	94.9	4.3
	Other professional		-4.9	-87.7	2.1	-5.5	-21.2	34.1	*	11.0	-10.5	19.7	0	-41.5	10.1
Environmental sciences	Total		-11.7	*	-42.2	-32.3	18.6	-13.8	5.3	-44.0	28.3	-22.1	0	27.9	123.2
	Doctorate:	Ph.D.	-5.3	0	-23.8	-37.7	16.7	-15.9	26.1	-50.2	*	-1.6	0	23.6	1030.3
		M.D.	-40.0	*	0	-100.0	0	-59.0	-100.0	-38.0	0	-12.3	0	0	0
	Other professional		-14.3	*	-63.3	-10.7	24.6	32.6	9.9	-40.6	-42.4	-34.1	0	30.3	52.3
Mathematical sciences	Total		-21.8	-100.0	-100.0	-2.6	62.0	65.5	8.2	-27.1	-7.7	7.3	-15.6	-38.6	-33.3
	Doctorate:	Ph.D.	-18.5	0	-100.0	-6.8	-22.7	20.5	-64.7	-43.2	-15.4	61.7	-44.4	-57.6	-31.1
		M.D.	4.7	0	0	45.0	*	0	0	*	0	0	0	0	-74.9
	Other professional		-24.2	-100.0	-100.0	-2.4	64.7	*	71.4	-17.7	-2.5	-16.5	18.8	-26.5	-32.3
Physical sciences	Total		12.7	54.4	7.1	-7.7	-48.8	99.1	-12.7	36.9	-20.1	11.2	0	32.1	101.4
	Doctorate:	Ph.D.	20.3	4.6	43.2	-0.3	-60.8	228.6	-12.7	31.7	-44.1	29.6	0	14.5	203.6
		M.D.	272.4	0	0	83.7	0	0	0	0	-10.5	*	0	0	0
	Other professional		-6.3	290.9	-39.2	-33.5	-23.6	22.8	-12.2	73.0	-10.5	-21.2	0	43.7	-0.9
Other fields	Total		1.3	-100.0	5.6	12.4	2.6	-49.7	-60.2	-48.4	14.1	-6.1	13.4	57.7	46.8
	Doctorate:	Ph.D.	-5.5	0	*	9.0	*	-100.0	-6.4	-40.2	42.9	-90.7	233.1	-31.5	*
		M.D.	-39.4	0	0	-8.2	0	0	0	-100.0	0	-68.8	-18.5	-2.2	0
	Other professional		7.6	-100.0	-38.4	16.1	-49.0	77.2	-45.6	-41.1	3.4	66.1	-33.3	95.8	37.0

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[a] Derived from Appendixes A1-A8. Asterisk (*) means percent change could not be computed because 1973 coefficient was zero.

[b] Includes NIA.

[c] Ph.D. means all academic doctorates (D.Sc., D.Ph., etc.); M.D. means all professional doctorates (D.D.S., D.V.M., etc.).

APP. A13 Percent Changes in Manpower Coefficients from 1974 to 1975[a]

FOS Group	Academic Level[c]		Total NIH	Institutes											
				AI	AM	CA	DE	ES	EY	GM	HD[b]	HL	LM	NS	RR
TOTAL ALL FIELDS	Total		-6.0	-15.4	-3.3	-2.0	-1.1	-8.8	-7.6	-8.8	-3.7	-10.9	-16.6	-6.8	14.0
	Doctorate:	Ph.D.	-5.7	-15.5	-5.2	1.2	7.9	-7.5	-10.1	-13.6	-9.8	-10.5	10.8	-4.6	11.0
		M.D.	-4.8	-6.6	0.2	-6.7	-25.9	71.2	-4.8	0.6	15.5	-6.5	-48.7	-18.9	23.5
	Other professional		-7.1	-19.0	-4.4	-4.9	-2.2	-20.5	-4.0	-12.5	-0.6	-14.9	-36.1	-12.7	13.0
Basic biomedical sciences	Total		-6.2	-17.1	-2.2	-4.9	1.9	-5.4	-5.1	-73.0	-2.0	-9.7	118.8	-10.2	35.4
	Doctorate:	Ph.D.	-5.8	-16.6	-3.2	-1.5	7.8	-0.7	-6.5	-84.3	-4.5	-8.4	*	-7.2	23.1
		M.D.	-6.7	-13.0	10.2	-17.3	24.8	29.8	-0.5	0	16.8	-3.2	0	-31.6	28.1
	Other professional		-6.8	-19.5	-6.2	-7.5	-3.1	-13.7	-4.4	-0.6	-2.6	-15.2	-100.0	-4.2	58.4
Internal medicine	Total		-9.4	7.9	-11.3	-21.6	0	-10.1	0	169.9	37.6	-7.1	0	-42.1	26.4
	Doctorate:	Ph.D.	-20.2	-30.0	-24.2	-22.6	0	0	0	90.7	-34.4	-17.3	0	2.7	34.5
		M.D.	-3.7	15.1	-13.9	2.9	0	0	0	101.2	141.5	-1.0	0	-35.8	14.3
	Other professional		-15[illegible]	24.2	7.6	-76.1	0	-10.1	0	397.6	-38.9	-20.5	0	-100.0	46.7
Clinical medicine	Total		-2.9	-41.2	-5.4	5.0	4.6	10.4	7.6	9.3	2.2	-26.9	-100.0	-16.7	-27.6
	Doctorate:	Ph.D.	3.5	134.4	-38.2	19.4	0	*	-4.3	-4.3	1.6	-37.5	0	-15.4	37.0
		M.D.	-2.1	26.1	24.9	-3.0	4.6	79.7	-1.4	38.3	10.2	-22.7	-100.0	-6.[illegible]	-48.9
	Other professional		-13.0	-100.0	-5.25	11.8	0	-100.0	41.1	1.1	-27.3	-26.7	0	-55.1	0.8
Dentistry	Total		7.0	-100.0	-100.0	*	-6.0	*	*	-100.0	-2.9	0	0	*	0
	Doctorate:	Ph.D.	14.6	0	-100.0	*	-0.3	0	0	0	0	0	0	*	0
		M.D.	-2.2	-100.0	0	*	-17.3	*	*	-100.0	20.7	0	0	*	0
	Other professional		19.4	-100.0	0	0	13.2	*	0	-100.0	-20.2	0	0	*	0
Behavioral sciences	Total		-10.1	339.1	-28.6	271.1	-27.6	6.6	-40.8	6.6	-11.6	-18.0	-12.9	-4.9	17.2
	Doctorate:	Ph.D.	-14.0	*	-3.8	438.5	-21.4	6.6	-49.2	-15.1	-21.9	1.5	-12.9	-2.9	21.4
		M.D.	-100.0	0	-100.0	0	0	0	0	0	-100.0	0	0	0	0
	Other professional		5.4	221.5	0	97.0	-36.4	0	6.5	*	19.3	-73.6	0	[illegible]	11.5
Other health fields	Total		-14.4	140.1	-100.0	5.5	-30.1	23.3	-36.1	-5.8	5.8	-28.1	0	[illegible]	0.4
	Doctorate:	Ph.D.	9.7	231.1	0	7.7	-10.1	*	*	11.6	162.2	-27.9	0	-26.8	46.2
		M.D.	-14.7	*	-100.0	-17.4	-100.0	0	-75.8	*	-73.7	-25.5	0	-100.0	94.3
	Other professional		-20.1	86.9	-100.0	9.4	20.9	-47.4	12.0	-21.2	5.0	-28.6	0	-7.9	-10.3
Environmental sciences	Total		-3.6	-30.2	111.7	60.8	0.1	-20.3	-58.0	15.4	-78.9	7.5	0	-15.9	-38.8
	Doctorate:	Ph.D.	-7.5	-30.2	63.2	102.9	-30.2	-27.7	-14.0	-11.4	-100.0	-8.2	0	29.2	-100.0
		M.D.	15.3	0	0	*	0	79.8	0	-100.0	0	-100.0	0	0	0
	Other professional		-0.5	0	227.9	-9.5	90.8	-10.9	-68.6	53.5	-53.1	25.1	0	-38.7	-3.3
Mathematical sciences	Total		16.3	*	*	-18.8	29.1	50.9	-52.5	-17.0	3.5	-5.7	-73.2	68.1	81.4
	Doctorate:	Ph.D.	1.0	0	*	-27.2	340.8	79.5	-100.0	-16.1	2.6	-18.9	-56.5	36.9	45.6
		M.D.	31.6	0	0	-44.4	14.3	0	0	-100.0	0	*	0	*	184.0
	Other professional		24.1	*	*	-11.6	-10.6	-25.5	-44.0	-7.3	4.0	3.1	-82.6	54.0	91.0
Physical sciences	Total		-6.0	-42.0	13.7	8.2	9.0	-41.1	106.2	-9.1	-12.5	-23.0	0	10.8	-54.3
	Doctorate:	Ph.D.	-1.5	-8.6	9.9	6.5	49.4	-45.7	26.1	-4.6	-33.6	-20.0	0	135.8	-53.8
		M.D.	14.8	0	*	-100.0	0	*	0	0	0	-43.0	0	*	0
	Other professional		-19.5	-84.5	3.0	29.4	-34.8	-46.3	598.0	-33.3	72.1	-26.4	0	-68.4	-55.4
Other fields	Total		-16.4	*	-100.0	-2.2	-41.3	-70.3	8.1	-51.2	-30.7	-12.3	-11.7	-27.0	-33.1
	Doctorate:	Ph.D.	-30.3	0	-100.0	-63.7	-100.0	0	2.3	-100.0	-82.4	473.6	0.6	-100.0	37.5
		M.D.	-8.6	0	0	182.2	0	0	0	0	0	5.4	-100.0	-100.0	0
	Other professional		-12.6	*	-100.0	8.9	18.0	-70.3	9.6	-17.8	-4.0	-31.8	3.5	-10.9	-36.2

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[a] Derived from Appendixes A1-A8. Asterisk (*) means percent change could not be computed because 1974 coefficient was zero.

[b] Includes NIA.

[c] Ph.D. means all academic doctorates (D.Sc., D.Ph., etc.); M.D. means all professional doctorates (D.D.S., D.V.M., etc.).

Tab. A14 NIH Field, Discipline, and Specialty Code (FDS) for Project Employment[a]

Basic medical and biological sciences

- A1 Anatomy, neuroanatomy
- A2 Anatomy, nec[b]
- A3 Bacteriology
- A4 Biochemistry, enzyme/metabolism
- A5 Biochemistry, hormone/vitamin
- A6 Biochemistry, protein/amino acid
- A7 Biochemistry, nec
- A8 Biology, developmental
- B1 Biology, nec
- B2 Biophysics, molecular structure
- B3 Biophysics, nec
- B4 Botany
- B5 Cell biology, molecular
- B6 Cell biology, nec
- B7 Ecology
- B8 Entomology
- C1 Genetics, biochemical and molecular
- C2 Genetics, nec
- C3 Immunology
- C4 Medical, general
- C5 Microbial biochemistry
- C6 Microbiology, nec
- C7 Nutrition
- C8 Parasitology
- C9 Pathology, experimental
- D1 Pathology, nec
- D2 Pharmacology
- D3 Physiology, cardiovas. & pulmonary
- D4 Physiology, endocrine
- D5 Physiology, gastrointestinal
- D6 Physiology, neuro and muscular
- D7 Physiology, renal
- D8 Physiology, nec
- E1 Predental
- E2 Premedical
- E3 Radiation, nonclinical
- E4 Virology
- E5 Zoology
- E9 Other basic biomedical sciences

Internal medicine: clinical

- F1 Allergy
- F2 Cardiovascular diseases
- F3 Endocrinology
- F4 Gastroenterology
- F5 Hematology
- F6 Immunology
- F7 Infectious diseases
- F8 Internal medicine, general
- G1 Metabolism
- G2 Pulmonary diseases
- G3 Renal diseases
- G9 Other internal medicine

Clinical medicine (except internal)

- H1 Anesthesiology
- H2 Chemotherapy, cancer
- H3 Chemotherapy, other
- H4 Dermatology
- H5 Neurology
- H6 Nuclear medicine
- H7 Obstetrics and gynecology
- H8 Oncology
- I1 Ophthalmology
- I2 Osteopathy
- I3 Otorhinolaryngology
- I4 Pediatrics, cardiology
- I5 Pediatrics, nec
- I6 Pharmacology, clinical
- I7 Physical medicine & rehabilitation
- I8 Preventive medicine & public health
- J1 Psychiatry
- J2 Radiology, diagnostic
- J3 Radiology, therapeutic
- J4 Radiology, nec
- J5 Surgery, cardiovascular
- J6 Surgery, general
- J7 Surgery, neurological
- J8 Surgery, orthopedic
- K1 Surgery, plastic
- K2 Surgery, thoracic
- K3 Surgery, nec
- K4 Tropical medicine
- K5 Urology
- K9 Other clinical medicine

Dentistry

- L1 Clinical dentistry, cleft palate
- L2 Clinical dentistry, oral pathology
- L3 Clinical dentistry, oral surgery
- L4 Clinical dentistry, periodontia
- L5 Dentistry, general
- L9 Other dental specialties

Behavioral and Social Sciences

- M1 Anthropology
- M2 Economics
- M3 Psychology, clinical
- M4 Psychology, developmental
- M5 Psychology, general & experimental
- M6 Psychology, physiological
- M7 Psychology, nec
- M8 Sociology
- M9 Other behavioral & social sciences

Other health-related fields

- N1 Audiology & speech therapy
- N2 Dental hygiene
- N3 Dietetics
- N4 Epidemiology
- N5 Health administration
- N6 nursing
- N7 Optometry
- P1 Pharmacy
- P2 Physical therapy
- P3 Social work
- P4 Veterinary medicine
- P9 Other health-related fields

Environmental sciences and engineering

- Q1 Air and water pollution
- Q2 Engineering
- Q3 Engineering, biomedical
- Q4 Engineering, environmental
- Q9 Other environmental sciences

Mathematics, statistics, and computer sciences

- R1 Biostatistics
- R2 Computer applications
- R3 Computer & information systems
- R4 Mathematics
- R5 Statistics
- R9 Other math. and stat.

Physical sciences

- S1 Chemistry, inorganic
- S2 Chemistry, organic
- S3 Chemistry, medicinal
- S4 Chemistry, physical
- S5 Chemistry, nec
- S6 Physics
- S9 Other physical sciences

Other fields

- T1 Arts and humanities
- T2 Audio-visual
- T3 Education
- T4 Library science
- T9 Other

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[a] From NIH (1973-75).

[b] Not elsewhere classified.

APPENDIX B

FINDINGS FROM THE SURVEY OF BIOMEDICAL SCIENTISTS

APP. B1 EMPLOYMENT STATUS SINCE EARNING DOCTORATE[a]

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S SURVEY RESP	 EST TOTAL	PERCENT OF TIME IN POST DOC	 F-T EMPL	 P-T EMPL	 SEEK EMPL	 OTHER STATUS
TOTAL BIOMEDICAL SCIENCES	4378	14288	37.4	54.3	2.4	1.5	4.5
ANIMAL SCIENCES	44	126	19.4	75.5	5.0	0.0	0.0
BIOCHEM & MOLECULAR BIOL	784	3616	57.6	36.1	1.9	1.1	5.3
BIOMATH/BIOSTATISTICS	117	221	2.5	91.7	3.5	1.8	0.5
BIOMEDICAL ENGINEERING	170	289	15.8	78.0	1.7	1.8	2.8
BIOPHYSICS	221	604	51.4	41.6	1.4	1.5	4.1
CELL BIOLOGY	165	505	41.4	47.8	4.2	1.0	5.6
DEVELOPMENTAL BIOLOGY	127	392	41.2	44.7	3.9	1.3	8.9
ENVIRON HLTH & TOXICOLOGY	106	240	17.8	77.2	2.8	0.5	1.8
EPIDEMIOLOGY	52	108	6.5	86.5	3.2	0.2	3.6
EVOLUT & TAXONOMIC BIOL	40	184	21.5	69.3	3.4	4.3	1.6
GENERAL BIOLOGY	156	703	14.8	78.7	2.3	2.4	1.8
GENETICS	255	579	36.4	52.2	2.2	2.9	6.3
IMMUNOLOGY	194	502	42.3	49.7	1.4	1.6	5.1
MICROBIOLOGY	355	1395	34.2	59.3	2.3	1.5	2.7
MORPHOLOGICAL SCIENCES	160	435	17.5	71.6	4.2	1.4	5.4
NEUROBIOLOGY	131	375	53.7	40.0	1.4	1.5	3.5
NUTRITION & FOOD SCIENCES	47	206	16.5	73.7	2.5	4.0	3.2
PATHOLOGY	128	265	17.7	79.2	0.9	0.5	1.7
PHARMACOLOGY & PHARM SCI	438	1170	28.1	64.6	1.3	1.3	4.7
PHYSIOLOGY	381	1445	31.4	57.0	3.2	1.3	7.1
PUBLIC HEALTH	87	198	5.4	86.1	3.7	2.8	2.0
VIROLOGY	85	282	50.2	46.4	0.5	0.5	2.5
BIOMEDICAL SCIENCES, OTHER	135	448	26.2	64.8	3.7	2.2	3.1
FY 1971 PHD'S	718	2792	25.9	67.6	1.7	1.1	3.8
FY 1972 PHD'S	756	2842	29.2	62.8	2.6	1.1	4.4
FY 1973 PHD'S	790	2799	35.3	55.1	3.0	1.6	5.0
FY 1974 PHD'S	831	2982	42.4	49.0	2.5	1.5	4.6
FY 1975 PHD'S	1283	2873	53.3	38.0	2.0	2.2	4.6
NIH/ADAMHA/HRA PREDOCS	2177	6425	43.4	48.6	2.0	1.3	4.7
OTHER BIOMEDICAL PHD'S	2201	7863	32.4	59.0	2.7	1.6	4.3
MALE	3479	11243	36.0	57.7	1.6	1.0	3.7
FEMALE	699	3045	42.5	42.0	5.1	3.2	7.3

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[a] The source for Appendixes B1-B20 is NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. B2 CURRENT (OCTOBER 1976) EMPLOYMENT STATUS

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S SURVEY RESP	ALL PHD'S EST TOTAL	PERCENT CURRENTLY IN POST DOC	F-T EMPL	P-T EMPL	SEEK EMPL	OTHER STATUS
TOTAL BIOMEDICAL SCIENCES	4429	14288	20.0	74.0	1.6	1.7	2.7
ANIMAL SCIENCES	45	126	6.3	89.7	1.6	2.4	
BIOCHEM & MOLECULAR BIOL	797	3616	33.8	60.5	1.0	1.8	2.8
BIOMATH/BIOSTATISTICS	119	221		96.8	1.4	1.8	
BIOMEDICAL ENGINEERING	174	289	8.3	88.6	1.4	.3	1.4
BIOPHYSICS	231	604	29.8	64.4	2.8	.8	2.2
CELL BIOLOGY	157	505	25.0	65.9	2.2	1.8	5.1
DEVELOPMENTAL BIOLOGY	127	392	26.5	65.3	1.3	1.0	5.9
ENVIRON HLTH & TOXICOLOGY	106	240	7.5	87.9	2.9		1.7
EPIDEMIOLOGY	52	108		89.8	1.9	2.8	5.6
EVOLUT & TAXONOMIC BIOL	41	184	9.2	84.8	3.8	2.2	
GENERAL BIOLOGY	156	703	8.5	90.8		.4	.3
GENETICS	256	579	18.8	71.3	2.1	3.1	4.7
IMMUNOLOGY	196	502	20.7	73.5	1.4	1.4	3.0
MICROBIOLOGY	357	1395	13.8	81.9	1.6	1.1	1.6
MORPHOLOGICAL SCIENCES	163	435	7.4	82.3	2.8	4.6	3.0
NEUROBIOLOGY	131	375	28.5	65.3	1.3		4.8
NUTRITION & FOOD SCIENCES	47	206	10.7	84.5		4.9	
PATHOLOGY	131	265	7.5	88.7	.4	1.9	1.5
PHARMACOLOGY & PHARM SCI	442	1170	14.5	81.6	.9	.7	2.2
PHYSIOLOGY	389	1445	13.2	78.5	2.4	1.6	4.2
PUBLIC HEALTH	88	198		94.4	3.0	1.0	[illegible]
VIROLOGY	87	282	27.7	63.8	.7	5.0	[illegible]
BIOMEDICAL SCIENCES, OTHER	137	448	16.7	74.1	5.6	2.9	.7
FY 1971 PHD'S	725	2792	5.5	88.6	1.7	1.7	2.5
FY 1972 PHD'S	769	2842	7.7	85.4	2.1	2.1	2.6
FY 1973 PHD'S	801	2799	15.9	78.4	2.4	1.8	1.5
FY 1974 PHD'S	841	2982	26.5	67.9	.8	1.6	3.2
FY 1975 PHD'S	1293	2873	43.7	50.5	1.1	1.1	3.5
NIH/ADAMHA/HRA PREDOCS	2206	6425	22.3	71.5	1.7	1.6	2.8
OTHER BIOMEDICAL PHD'S	2223	7863	18.1	76.1	1.6	1.7	2.5
MALE	3520	11243	18.2	78.1	.8	1.1	1.7
FEMALE	909	3045	26.8	58.8	4.6	3.6	6.1

APP. B3 SECTOR OF EMPLOYMENT

PERCENT EMPLOYED OR ON POSTDOCTORAL APPOINTMENTS IN

	ALL EMPLOYED		**EDUCATIONAL INSTITUTION**					***GOVERNMENT***			****BUSINESS****			**OTHER SECTORS**		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	TOTAL	UNIV/ COLL	MED SCHL	PROF SCHL	OTHER EDUC	TOTAL	FEDL GOVT	OTHER GOVT	TOTAL	PHARM FIRM	OTHER BUSN	TOTAL	HOSP/ CLNIC	OTHER TYPE
TOTAL BIOMEDICAL SCIENCES	4200	13671	70.2	29.8	30.9	7.2	2.2	11.4	9.7	1.7	11.7	4.3	7.5	6.7	2.8	3.9
ANIMAL SCIENCES	44	123	74.0	44.7	13.8	15.4		8.9	7.3	1.6	8.9	4.9	4.1	8.1	4.9	3.3
BIOCHEM & MOLECULAR BIOL	747	3448	70.6	31.1	34.2	2.9	2.4	9.2	8.2	1.0	11.7	2.7	9.0	8.4	3.9	4.5
BIOMATH/BIOSTATISTICS	117	217	63.1	18.4	29.0	14.7	.9	21.2	18.0	3.2	9.7	6.9	2.8	6.0	.9	5.1
BIOMEDICAL ENGINEERING	168	284	60.4	21.8	36.4	2.1		9.3	8.6	.7	22.1	1.1	21.1	8.2	3.9	4.3
BIOPHYSICS	219	586	61.5	24.3	32.4	1.9	2.8	16.6	13.1	3.5	14.2	1.8	12.4	7.7	4.2	3.5
CELL BIOLOGY	146	470	80.3	41.3	32.4	4.8	1.9	3.5	2.6	.9	3.2	.2	3.0	13.0	2.6	10.4
DEVELOPMENTAL BIOLOGY	117	365	83.2	43.7	31.3	3.0	5.2	9.1	7.1	1.9	1.1		1.1	6.6	1.1	5.5
ENVIRON HLTH & TOXICOLOGY	104	236	39.0	9.3	18.6	11.0		31.9	26.7	5.1	27.1	6.4	20.8	2.1		2.1
EPIDEMIOLOGY	48	99	70.1	6.2	25.8	38.1		20.6	12.4	8.2	2.1	2.1		7.2		7.2
EVOLUT & TAXONOMIC BIOL	40	180	80.6	71.7	1.7		7.2	12.2	12.2		1.1		1.1	6.1		6.1
GENERAL BIOLOGY	153	698	67.4	58.3	2.3	.4	6.3	13.9	9.1	4.9	14.8	.4	14.4	3.9	2.0	1.9
GENETICS	234	534	81.4	55.6	19.7	2.3	3.8	6.6	5.7	.9	8.5	1.7	6.8	3.4	.8	2.7
IMMUNOLOGY	185	480	72.3	18.0	48.2	5.3	.8	8.5	7.8	.6	7.6	5.9	1.7	11.6	6.3	5.3
MICROBIOLOGY	347	1358	63.5	29.8	26.8	5.1	1.8	15.8	13.5	2.2	14.2	5.3	8.9	6.5	3.4	3.1
MORPHOLOGICAL SCIENCES	150	402	89.5	12.0	61.5	15.3	.8	5.5	5.0	.5	3.8	1.0	2.8	1.3		1.3
NEUROBIOLOGY	125	357	86.8	28.9	52.7	1.7	3.6	7.0	5.6	1.4	1.7	.6	1.1	4.5	2.8	1.7
NUTRITION & FOOD SCIENCES	45	196	81.1	53.6	24.5	1.5	1.5	1.5	1.5		14.3	1.0	13.3	3.1	1.5	1.5
PATHOLOGY	126	256	70.6	8.2	35.3	27.1		12.2	12.2		11.4	3.9	7.5	5.9	3.1	2.7
PHARMACOLOGY & PHARM SCI	423	1136	58.7	5.4	28.5	24.5	.2	9.9	8.4	1.4	27.6	21.6	6.0	3.9	1.2	2.8
PHYSIOLOGY	361	1361	76.5	32.2	35.1	6.5	2.7	11.3	10.5	.8	7.2	2.5	4.6	5.0	2.2	2.8
PUBLIC HEALTH	86	193	49.7	22.3	9.3	17.1	1.0	34.7	19.2	15.5	4.1		4.1	11.4	5.2	6.2
VIROLOGY	82	260	62.3	15.4	41.2	3.5	2.3	16.2	16.2		11.5	8.5	3.1	10.0	1.5	8.5
BIOMEDICAL SCIENCES, OTHER	133	432	73.8	31.7	28.2	13.9		10.9	10.9		6.9	1.4	5.6	8.3	2.8	5.6
FY 1971 PHD'S	690	2676	69.9	30.0	30.5	7.8	1.6	10.1	8.0	2.1	15.0	6.7	8.3	5.0	1.5	3.5
FY 1972 PHD'S	723	2709	67.6	30.4	27.5	7.1	2.6	13.2	11.4	1.8	11.7	4.3	7.4	7.5	2.3	5.2
FY 1973 PHD'S	770	2706	70.3	31.8	29.6	6.9	1.9	11.0	8.8	2.2	11.9	3.7	8.1	6.8	4.0	2.9
FY 1974 PHD'S	791	2840	69.9	28.0	32.7	6.7	2.4	11.2	10.1	1.2	11.8	3.8	8.0	7.0	3.0	4.1
FY 1975 PHD'S	1226	2740	72.9	28.9	34.1	7.5	2.4	11.5	10.1	1.4	8.4	3.0	5.4	7.2	3.1	4.1
NIH/ADAMHA/HRA PREDOCS	2087	6139	73.9	27.6	36.7	8.0	1.7	9.7	8.3	1.5	10.5	4.0	6.5	5.9	2.3	3.6
OTHER BIOMEDICAL PHD'S	2113	7332	67.1	31.7	26.3	6.6	2.6	12.7	10.8	1.9	12.8	4.5	8.3	7.4	3.2	4.2
MALE	3376	10923	67.8	28.3	30.0	7.7	1.8	12.5	10.6	1.8	12.9	4.5	8.4	6.8	2.8	3.9
FEMALE	824	2748	79.2	35.9	34.4	5.1	3.8	7.2	5.9	1.3	7.1	3.2	3.8	6.5	2.5	4.0

APP. 24 TIME SPENT ON RESEARCH AND OTHER WORK ACTIVITIES

	ALL EMPLOYED		PERCENT OF TIME SPENT IN						
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	R&D	TEACH	MGMT/ ADMIN	CON SULT	OTHER PROF SERV	OTHER ACTIVITY	PERCENT WITH SOME TIME IN RESEARCH
TOTAL BIOMEDICAL SCIENCES	4160	13671	55.5	23.5	11.1	2.8	5.4	1.7	89.5
ANIMAL SCIENCES	44	123	43.2	26.8	10.9	2.9	16.2	0.0	82.9
BIOCHEM & MOLECULAR BIOL	742	3448	69.4	15.3	7.7	1.2	4.5	1.9	91.6
BIOMATH/BIOSTATISTICS	116	217	38.3	20.2	14.5	21.8	3.6	1.5	87.4
BIOMEDICAL ENGINEERING	166	284	57.4	15.6	16.2	4.4	4.6	2.0	95.3
BIOPHYSICS	216	586	60.2	14.6	11.0	1.9	1.5	2.7	91.3
CELL BIOLOGY	144	470	61.3	27.2	7.6	1.4	2.4	0.1	90.2
DEVELOPMENTAL BIOLOGY	117	365	57.5	31.8	4.7	1.0	2.5	2.5	88.2
ENVIRON HLTH & TOXICOLOGY	103	236	35.1	15.9	24.2	8.6	13.7	2.6	77.4
EPIDEMIOLOGY	48	99	39.2	26.4	19.6	5.8	6.3	0.7	95.9
EVOLUT & TAXONOMIC BIOL	39	180	35.3	45.1	12.3	3.7	2.3	1.4	91.6
GENERAL BIOLOGY	152	698	31.4	38.8	14.9	7.8	5.8	1.3	80.9
GENETICS	234	534	51.6	33.7	7.2	1.6	4.7	1.2	88.4
IMMUNOLOGY	183	480	62.9	18.9	8.0	2.4	6.9	0.9	90.0
MICROBIOLOGY	343	1358	50.2	24.0	14.4	2.7	6.6	2.1	85.8
MORPHOLOGICAL SCIENCES	148	402	40.0	40.2	10.3	1.9	7.2	0.6	91.3
NEUROBIOLOGY	124	357	64.3	25.0	5.6	1.1	3.8	0.3	93.0
NUTRITION & FOOD SCIENCES	45	196	40.2	37.2	12.4	2.2	8.0	0.0	89.8
PATHOLOGY	125	256	41.8	21.4	13.3	4.2	18.4	0.9	89.2
PHARMACOLOGY & PHARM SCI	418	1136	57.9	18.7	14.8	1.8	4.8	2.1	93.1
PHYSIOLOGY	358	1361	48.3	31.9	9.8	2.0	5.6	2.4	86.3
PUBLIC HEALTH	84	193	19.6	22.5	40.7	9.1	6.6	1.6	77.7
VIROLOGY	79	260	76.2	12.8	6.7	0.9	3.0	0.4	97.6
BIOMEDICAL SCIENCES, OTHER	132	432	49.6	28.2	11.7	3.0	5.4	2.1	95.8
FY 1971 PHD'S	681	2676	50.6	27.0	13.7	2.6	4.5	1.6	91.1
FY 1972 PHD'S	710	2709	50.3	26.1	13.2	2.7	5.5	2.3	89.8
FY 1973 PHD'S	761	2706	52.0	26.2	10.9	3.4	5.7	1.8	88.9
FY 1974 PHD'S	786	2840	57.7	21.7	10.8	2.5	5.9	1.4	87.8
FY 1975 PHD'S	1222	2740	66.4	16.9	7.2	2.7	5.4	1.4	89.9
NIH/ADAMHA/HRA PREDOCS	2066	6139	59.8	21.6	9.1	2.5	5.2	1.8	91.0
OTHER BIOMEDICAL PHD'S	2094	7532	52.0	25.1	12.7	3.0	5.6	1.6	88.2
MALE	3340	10923	54.5	23.1	11.7	2.9	6.1	1.8	89.8
FEMALE	820	2748	59.5	25.4	8.9	2.2	2.6	1.4	88.0

PP. [illegible] ORIENTATION, HEALTH-RELATEDNESS, AND SUPPORT/SPONSORSHIP OF RESEARCH

	RESEARCHERS		PERCENT ENGAGED IN RESEARCH CHARACTERIZED AS											
			ORIENTED		**RELATED TO HEALTH**			***SUPPORTED OR SPONSORED BY***						
HD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	CLINIC ALLY	OTHER	DIR ECTLY	INDIR ECTLY	NOT AT ALL	NON FEDL	TOTAL FEDL	NIH	ADAMHA		HRA	OTHER FEDL
OTAL BIOMEDICAL SCIENCES	3742	11972	30.6	69.4	58.6	35.5	5.9	37.0	63.0	47.3	2.1		.8	19.1
ANIMAL SCIENCES	38	102	64.6	35.4	53.1	35.4	11.5	41.7	58.3	32.3				35.4
BIOCHEM & MOLECULAR BIOL	681	3081	27.1	72.9	55.3	41.4	3.3	28.7	71.3	61.2	1.8		.2	15.6
BIOMATH/BIOSTATISTICS	105	188	61.7	38.3	82.8	15.0	2.2	26.3	73.7	54.3	4.8		10.8	16.7
BIOMEDICAL ENGINEERING	158	263	52.2	47.8	70.7	23.7	5.6	35.3	64.7	39.8	.4		1.6	33.5
BIOPHYSICS	201	515	22.4	77.6	50.6	43.8	5.6	28.9	71.1	55.7				24.3
CELL BIOLOGY	131	406	14.5	85.5	56.1	41.1	2.8	31.3	68.7	61.4			.5	17.7
DEVELOPMENTAL BIOLOGY	105	321	15.8	84.2	46.0	48.9	5.1	31.7	68.3	63.1	.3			12.1
ENVIRON HLTH & TOXICOLOGY	78	181	36.0	64.0	82.8	16.0	1.2	38.4	61.6	22.7			3.5	44.2
EPIDEMIOLOGY	46	93	56.0	44.0	92.3	7.7		23.6	76.4	41.6	13.5		10.1	19.1
EVOLUT & TAXONOMIC BIOL	36	163	2.7	97.3	8.7	49.3	42.0	64.0	36.0	11.3				34.0
GENERAL BIOLOGY	122	558	6.5	93.5	10.5	51.7	37.8	46.1	53.9	8.8	.6			44.5
GENETICS	209	466	24.3	75.7	36.6	48.9	14.5	40.0	60.0	43.4	2.4			23.0
IMMUNOLOGY	166	422	45.9	54.1	81.8	18.2		28.9	71.1	66.4	1.7			11.3
MICROBIOLOGY	298	1145	40.6	59.4	66.5	29.7	3.8	43.1	56.9	40.7	1.3		.2	20.2
MORPHOLOGICAL SCIENCES	136	359	28.9	71.1	61.7	35.9	2.4	55.3	44.7	41.8				5.2
NEUROBIOLOGY	114	330	10.1	89.9	43.4	54.7	1.8	26.7	73.3	61.8	5.6		.9	14.0
NUTRITION & FOOD SCIENCES	41	176	43.4	56.6	76.1	19.4	4.5	42.8	57.2	38.2	4.6			19.1
PATHOLOGY	112	222	70.6	29.4	83.3	16.7		43.1	56.9	45.8				17.1
PHARMACOLOGY & PHARM SCI	387	1034	37.4	62.6	82.6	16.6	.7	47.0	53.0	37.7	8.0		1.9	9.6
PHYSIOLOGY	312	1144	31.3	68.7	57.0	39.0	3.9	41.8	58.2	40.8	1.6		.4	19.8
PUBLIC HEALTH	64	146	31.0	69.0	82.5	11.9	5.6	52.5	47.5	1.6	3.3		13.1	31.1
VIROLOGY	76	245	30.6	69.4	59.2	38.8	2.1	29.8	70.2	49.2				23.9
BIOMEDICAL SCIENCES, OTHER	126	412	31.6	68.4	59.4	29.4	11.2	41.3	58.7	43.3	3.4		1.0	18.3
FY 1971 PHD'S	619	2366	32.6	67.4	63.7	29.3	7.0	39.3	60.7	45.9	1.3		1.0	19.7
FY 1972 PHD'S	648	2343	31.5	68.5	60.4	36.3	3.3	36.9	63.1	45.0	2.2		.7	23.0
FY 1973 PHD'S	683	2363	31.9	68.1	58.8	35.2	6.0	44.0	56.0	40.3	3.5		1.0	17.1
FY 1974 PHD'S	694	2461	29.6	70.4	57.4	36.1	6.5	36.1	63.9	50.0	1.5		1.0	18.6
FY 1975 PHD'S	1098	2439	27.6	72.4	53.0	40.3	6.7	29.2	70.8	54.7	2.3		.5	17.4
NIH/ADAMHA/HRA PREDOCS	1891	5452	28.9	71.1	59.7	37.1	3.1	33.0	67.0	55.3	2.4		.8	15.5
OTHER BIOMEDICAL PHD'S	1851	6520	32.0	68.0	57.7	34.0	8.3	40.4	59.6	40.5	2.0		.9	22.2
MALE	3022	9574	31.2	68.8	59.2	34.6	6.1	37.9	62.1	45.5	2.2		.8	20.4
FEMALE	720	2398	28.5	71.5	56.2	38.8	5.0	33.6	66.4	54.3	2.1		.9	14.0

APP. B6 IMPORTANCE OF DOCTORATE AS CREDENTIAL FOR ATTAINING PRESENT POSITION

PHD FIELD/YEAR/SUPPORT/SEX	F-T EMPLOYED SURVEY RESP	F-T EMPLOYED EST TOTAL	PERCENT WHO CONSIDER DEGREE ESSENTIAL	PERCENT WHO CONSIDER DEGREE HELPFUL	PERCENT WHO CONSIDER DEGREE NOT NEEDED	PERCENT WHO CONSIDER DEGREE UNCERTAIN
TOTAL BIOMEDICAL SCIENCES	3211	10576	80.5	15.3	3.2	.9
ANIMAL SCIENCES	40	113	66.4	28.3	5.3	
BIOCHEM & MOLECULAR BIOL	435	2188	81.4	15.3	2.6	.7
BIOMATH/BIOSTATISTICS	114	214	78.5	15.9	4.2	1.4
BIOMEDICAL ENGINEERING	151	256	70.3	22.3	5.9	1.6
BIOPHYSICS	141	389	73.8	21.1	4.6	.5
CELL BIOLOGY	101	333	92.1	5.7	1.2	.9
DEVELOPMENTAL BIOLOGY	75	256	85.2	10.9	3.5	.4
ENVIRON HLTH & TOXICOLOGY	94	211	73.9	23.7	2.4	
EPIDEMIOLOGY	48	97	62.9	27.8	7.2	2.1
EVOLUT & TAXONOMIC BIOL	36	156	84.6	10.3	5.1	
GENERAL BIOLOGY	137	638	77.6	20.1	1.3	1.1
GENETICS	177	413	82.7	9.5	5.4	2.4
IMMUNOLOGY	132	369	85.9	8.4	4.3	1.4
MICROBIOLOGY	283	1142	81.9	14.4	2.5	1.2
MORPHOLOGICAL SCIENCES	132	358	85.8	9.8	2.8	1.7
NEUROBIOLOGY	80	245	90.2	6.9	2.9	
NUTRITION & FOOD SCIENCES	39	174	79.3	16.7	4.0	
PATHOLOGY	114	235	58.3	36.6	5.1	
PHARMACOLOGY & PHARM SCI	348	955	85.5	11.4	2.3	.7
PHYSIOLOGY	296	1135	80.4	14.2	4.7	.8
PUBLIC HEALTH	83	187	58.8	36.4	3.2	1.6
VIROLOGY	52	180	88.9	7.8	3.3	
BIOMEDICAL SCIENCES, OTHER	103	332	77.4	18.7	2.1	1.8
FY 1971 PHD'S	651	2475	86.0	10.8	2.3	.9
FY 1972 PHD'S	659	2428	83.4	13.0	2.8	.8
FY 1973 PHD'S	642	2195	81.8	14.7	2.7	.8
FY 1974 PHD'S	588	2026	74.2	20.3	4.7	.8
FY 1975 PHD'S	671	1452	73.1	21.1	4.3	1.4
NIH/ADAMHA/HRA PREDOCS	1543	4595	82.6	13.9	2.6	.9
OTHER BIOMEDICAL PHD'S	1668	5981	78.9	16.5	3.7	1.0
MALE	2686	8786	79.9	15.8	3.4	.9
FEMALE	525	1790	83.3	12.9	2.5	1.2

APP. B7 MINIMUM LEVEL OF TRAINING NEEDED TO FULFILL PRESENT JOB REQUIREMENTS

	F-T EMPLOYED		PERCENT WHO CONSIDER LEVEL NEEDED				
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	POST DOC	MD/ PHD	MS/MA	BS/BA	OTHER
TOTAL BIOMEDICAL SCIENCES	3199	10576	27.1	58.1	10.1	3.0	1.6
ANIMAL SCIENCES	40	113	15.9	71.7	12.4		
BIOCHEM & MOLECULAR BIOL	435	2188	42.5	44.5	7.6	2.3	3.2
BIOMATH/BIOSTATISTICS	113	214	3.3	78.9	15.5	.9	1.4
BIOMEDICAL ENGINEERING	149	256	16.6	54.9	19.0	6.7	2.8
BIOPHYSICS	140	389	37.0	37.8	16.6	7.0	1.6
CELL BIOLOGY	101	333	34.7	60.1	3.9	1.2	
DEVELOPMENTAL BIOLOGY	75	256	29.3	55.9	13.3		1.6
ENVIRON HLTH & TOXICOLOGY	93	211	12.9	57.4	20.6	9.1	
EPIDEMIOLOGY	48	97	11.3	80.4	8.2		
EVOLUT & TAXONOMIC BIOL	36	156	4.5	80.1	5.8	8.3	1.3
GENERAL BIOLOGY	137	638	5.3	69.3	21.3	3.8	.3
GENETICS	177	413	18.5	68.1	6.6	4.9	1.9
IMMUNOLOGY	132	369	39.3	54.5	4.3	.5	1.4
MICROBIOLOGY	282	1142	28.9	59.4	8.6	2.6	.4
MORPHOLOGICAL SCIENCES	131	358	14.3	75.8	6.2	2.2	1.4
NEUROBIOLOGY	79	245	41.6	47.3	9.1	2.1	
NUTRITION & FOOD SCIENCES	38	174	9.3	64.5	26.2		
PATHOLOGY	113	235	15.4	71.8	4.7	.9	7.3
PHARMACOLOGY & PHARM SCI	348	955	25.3	64.9	4.9	4.5	.3
PHYSIOLOGY	295	1135	24.4	59.8	10.0	3.8	2.0
PUBLIC HEALTH	82	187	7.6	55.1	35.7	1.6	
VIROLOGY	52	180	51.7	39.4	5.0	3.9	
BIOMEDICAL SCIENCES, OTHER	103	332	22.6	65.4	7.2	.6	4.2
FY 1971 PHD'S	650	2475	32.1	58.1	5.5	2.3	2.1
FY 1972 PHD'S	653	2428	31.9	55.6	8.1	3.6	.8
FY 1973 PHD'S	642	2195	26.1	61.5	8.9	2.6	.9
FY 1974 PHD'S	583	2026	23.4	54.9	16.3	2.8	2.6
FY 1975 PHD'S	671	1452	17.4	61.6	14.5	4.3	2.2
NIH/ADAMHA/HRA PREDOCS	1535	4595	34.9	52.7	8.0	2.6	1.8
OTHER BIOMEDICAL PHD'S	1664	5981	21.2	62.2	11.8	3.4	1.5
MALE	2676	8786	27.3	58.4	9.2	3.2	1.8
FEMALE	523	1790	26.0	56.4	14.4	2.4	.8

APP. B8 IMPORTANCE OF PREDOCTORAL RESEARCH EXPERIENCE TO PRESENT POSITION

	F-T EMPLOYED		PERCENT WHO CONSIDER EXPERIENCE			
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	ESSENTIAL	USEFUL	NOT USEFL	UNCERTAIN
TOTAL BIOMEDICAL SCIENCES	3175	10576	62.1	32.1	3.8	2.0
ANIMAL SCIENCES	40	113	64.6	31.9	1.8	1.8
BIOCHEM & MOLECULAR BIOL	434	2188	65.6	26.6	5.8	2.1
BIOMATH/BIOSTATISTICS	113	214	69.8	25.0	.9	4.2
BIOMEDICAL ENGINEERING	148	256	54.8	34.0	8.0	3.2
BIOPHYSICS	140	389	59.0	34.3	5.2	1.6
CELL BIOLOGY	100	333	69.8	26.2	3.4	.6
DEVELOPMENTAL BIOLOGY	75	256	57.8	29.7	5.5	7.0
ENVIRON HLTH & TOXICOLOGY	92	211	55.1	35.7	5.8	3.4
EPIDEMIOLOGY	47	97	67.4	30.5		2.1
EVOLUT & TAXONOMIC BIOL	36	156	57.7	32.1	5.1	5.1
GENERAL BIOLOGY	135	638	56.9	36.3	6.3	.5
GENETICS	175	413	59.3	35.3	2.7	2.7
IMMUNOLOGY	132	369	72.9	22.8	2.7	1.6
MICROBIOLOGY	277	1142	56.8	38.6	3.4	1.2
MORPHOLOGICAL SCIENCES	131	358	63.8	29.2	4.2	2.8
NEUROBIOLOGY	79	245	78.6	21.0	.4	
NUTRITION & FOOD SCIENCES	38	174	60.0	40.0		
PATHOLOGY	113	235	51.9	42.9	2.1	3.0
PHARMACOLOGY & PHARM SCI	345	955	61.5	33.9	2.4	2.1
PHYSIOLOGY	290	1135	63.6	32.4	2.2	1.9
PUBLIC HEALTH	82	187	38.9	51.4	3.8	5.9
VIROLOGY	51	180	74.9	25.1		
BIOMEDICAL SCIENCES, OTHER	102	332	58.2	38.2	2.1	1.5
FY 1971 PHD'S	649	2475	65.6	30.2	2.7	1.5
FY 1972 PHD'S	646	2428	63.9	29.4	3.8	2.9
FY 1973 PHD'S	638	2195	62.1	31.3	4.3	2.3
FY 1974 PHD'S	582	2026	59.1	35.3	4.7	.8
FY 1975 PHD'S	660	1452	56.9	36.8	3.6	2.7
NIH/ADAMHA/HRA PREDOCS	1532	4595	65.1	29.4	3.8	1.7
OTHER BIOMEDICAL PHD'S	1643	5981	59.7	34.2	3.8	2.3
MALE	2655	8786	62.5	31.6	3.7	2.1
FEMALE	520	1790	59.9	34.4	4.1	1.6

APP. B9 OVERALL RELEVANCE OF DOCTORAL DEGREE, TRAINING, AND RESEARCH EXPERIENCE TO PRESENT EMPLOYMENT SITUATION

	LABOR FORCE[a]		PERCENT WHO CONSIDER PHD		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	ESSENTIAL	USEFUL	NOT USED[b]
TOTAL BIOMEDICAL SCIENCES	3363	11046	88.5	7.5	4.0
ANIMAL SCIENCES	42	118	94.1	3.4	2.5
BIOCHEM & MOLECULAR BIOL	464	2290	89.3	5.5	5.3
BIOMATH/BIOSTATISTICS	119	221	90.5	6.3	3.2
BIOMEDICAL ENGINEERING	155	261	82.0	12.3	5.7
BIOPHYSICS	150	411	81.0	14.1	4.9
CELL BIOLOGY	106	353	92.6	4.8	2.6
DEVELOPMENTAL BIOLOGY	80	265	88.7	9.8	1.5
ENVIRON HLTH & TOXICOLOGY	97	218	85.3	14.7	
EPIDEMIOLOGY	50	102	94.1	2.9	2.9
EVOLUT & TAXONOMIC BIOL	38	167	79.0	9.6	11.4
GENERAL BIOLOGY	138	641	84.1	14.5	1.4
GENETICS	192	443	84.7	7.7	7.7
IMMUNOLOGY	139	383	93.5	3.1	3.4
MICROBIOLOGY	291	1180	90.4	6.6	3.0
MORPHOLOGICAL SCIENCES	143	390	89.0	5.4	5.6
NEUROBIOLOGY	82	250	95.2	3.2	1.6
NUTRITION & FOOD SCIENCES	41	184	87.5	7.1	5.4
PATHOLOGY	117	241	91.7	5.4	2.9
PHARMACOLOGY & PHARM SCI	355	974	95.3	2.9	1.8
PHYSIOLOGY	311	1193	87.3	9.2	3.4
PUBLIC HEALTH	87	195	70.3	27.2	2.6
VIROLOGY	56	196	88.3	4.6	7.1
BIOMEDICAL SCIENCES, OTHER	110	370	83.8	7.6	8.6
FY 1971 PHD'S	677	2570	91.9	4.2	3.9
FY 1972 PHD'S	693	2548	90.4	6.2	3.5
FY 1973 PHD'S	672	2311	89.3	6.1	4.6
FY 1974 PHD'S	614	2099	84.3	11.4	4.3
FY 1975 PHD'S	707	1518	84.0	12.1	3.9
NIH/ADAMHA/HRA PREDOCS	1621	4808	89.9	6.0	4.0
OTHER BIOMEDICAL PHD'S	1742	6238	87.4	8.6	4.0
MALE	2759	9004	89.8	7.2	3.0
FEMALE	604	2042	82.5	8.9	8.6

[a] Labor force includes persons employed in positions other than postdoctoral appointments as well as unemployed persons who are seeking positions.

[b] Included under the "not used" category are persons unemployed or part-time employed who are actively seeking full-time positions, and also persons employed in positions in which they consider their doctoral training not useful.

APP. B10 REASON FOR TAKING POSTDOCTORAL APPOINTMENT WITHIN A YEAR AFTER EARNING DOCTORATE

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S SURVEY RESP	 EST TOTAL	PERCENT WHO HELD APPT	HELD POSTDOC SURVEY RESP	 EST TOTAL	PERCENT TAKING APPT FOR RES EXPER	 FIELD SWTCH	 NO EMPL	 OTHER REASON
TOTAL BIOMEDICAL SCIENCES	4429	14288	55.7	2323	7957	61.9	16.1	13.3	8.7
ANIMAL SCIENCES	45	126	31.7	14	40	65.0		20.0	15.0
BIOCHEM & MOLECULAR BIOL	797	3616	78.4	619	2836	58.8	21.4	11.8	8.0
BIOMATH/BIOSTATISTICS	119	221	6.8	11	15	53.3	6.7	26.7	13.3
BIOMEDICAL ENGINEERING	174	289	26.0	46	75	56.2	15.1	19.2	9.6
BIOPHYSICS	231	604	75.8	172	458	59.5	18.7	15.6	6.2
CELL BIOLOGY	157	505	66.7	107	337	70.3	16.3	4.2	9.2
DEVELOPMENTAL BIOLOGY	127	392	62.0	85	243	58.0	24.3	2.5	15.2
ENVIRON HLTH & TOXICOLOGY	106	240	24.2	24	58	70.7	13.8	8.6	6.9
EPIDEMIOLOGY	52	108	12.0	5	13	84.6	15.4		
EVOLUT & TAXONOMIC BIOL	41	184	42.9	15	79	54.5	3.9	37.7	3.9
GENERAL BIOLOGY	156	703	26.7	44	188	69.7	3.2	22.2	4.9
GENETICS	256	579	52.5	134	304	52.3	20.6	18.5	8.7
IMMUNOLOGY	196	502	64.7	129	325	84.1	2.8	8.1	5.0
MICROBIOLOGY	357	1395	55.4	194	773	52.2	18.4	19.6	9.7
MORPHOLOGICAL SCIENCES	163	435	32.0	54	139	65.5	6.5	12.2	15.8
NEUROBIOLOGY	131	375	69.9	93	262	80.9	7.3	5.7	6.1
NUTRITION & FOOD SCIENCES	47	206	32.5	16	67	58.2		31.3	10.4
PATHOLOGY	131	265	27.2	37	72	65.2	6.1	7.6	21.2
PHARMACOLOGY & PHARM SCI	442	1170	43.1	190	504	52.0	20.5	16.8	10.8
PHYSIOLOGY	389	1445	54.6	215	789	73.4	6.9	11.0	8.7
PUBLIC HEALTH	88	198	9.6	7	19	47.4		26.3	26.3
VIROLOGY	87	282	72.0	60	203	66.7	7.6	15.7	10.1
BIOMEDICAL SCIENCES, OTHER	137	448	35.3	52	158	59.6	17.3	17.9	5.1
FY 1971 PHD'S	725	2792	55.8	360	1558	63.5	15.8	13.0	7.7
FY 1972 PHD'S	769	2842	52.6	378	1496	61.1	20.0	13.2	5.8
FY 1973 PHD'S	801	2799	53.6	415	1501	61.2	13.4	15.1	10.4
FY 1974 PHD'S	841	2982	54.0	404	1611	62.0	16.6	12.4	9.0
FY 1975 PHD'S	1293	2873	62.3	766	1791	61.9	15.0	12.9	10.2
NIH/ADAMHA/HRA PREDOCS	2206	6425	65.2	1336	4188	60.9	15.8	11.7	11.6
OTHER BIOMEDICAL PHD'S	2223	7863	47.9	987	3769	63.1	16.4	15.0	5.4
MALE	3520	11243	54.7	1791	6155	62.3	15.9	14.1	7.7
FEMALE	909	3045	59.2	532	1802	60.6	16.9	10.6	11.9

APP. B11 PRIMARY SOURCE OF SUPPORT FOR CURRENT POSTDOCTORAL APPOINTMENT

	POSTDOCS		PERCENT WITH SUPPORT FROM				
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	FEDL FEL/ TRNG	FEDL RES GRANT	UNIV OR STATE	PER SONAL	OTHER/ UNKNOWN
TOTAL BIOMEDICAL SCIENCES	931	2862	58.3	22.1	4.4	.3	14.9
ANIMAL SCIENCES	3	8	100.0				
BIOCHEM & MOLECULAR BIOL	305	1224	56.5	22.2	5.1		16.3
BIOMATH/BIOSTATISTICS							
BIOMEDICAL ENGINEERING	17	24	62.5	29.2		4.2	4.2
BIOPHYSICS	74	180	53.1	30.3			16.6
CELL BIOLOGY	43	126	57.3	10.3	2.6		29.9
DEVELOPMENTAL BIOLOGY	39	104	63.1	20.4	3.9		12.6
ENVIRON HLTH & TOXICOLOGY	7	18	27.8	55.6			16.7
EPIDEMIOLOGY							
EVOLUT & TAXONOMIC BIOL	3	17		17.6	41.2	41.2	
GENERAL BIOLOGY	17	60	35.0	41.7	6.7		16.7
GENETICS	54	109	62.4	22.9	.9		13.8
IMMUNOLOGY	48	104	65.2	18.5	4.3		12.0
MICROBIOLOGY	59	193	73.8	10.5	8.4		7.3
MORPHOLOGICAL SCIENCES	13	32	51.7	24.1	10.3		13.8
NEUROBIOLOGY	42	107	60.0	35.2	1.0		3.8
NUTRITION & FOOD SCIENCES	6	22	68.2	13.6	18.2		
PATHOLOGY	12	20	35.0	25.0	15.0		25.0
PHARMACOLOGY & PHARM SCI	74	170	64.9	19.6	1.2		14.3
PHYSIOLOGY	60	191	65.8	21.4	4.8		8.0
PUBLIC HEALTH							
VIROLOGY	29	78	55.1	23.1			21.8
BIOMEDICAL SCIENCES, OTHER	26	75	49.3	21.3			29.3
FY 1971 PHD'S	33	153	56.1	23.0	6.5		14.4
FY 1972 PHD'S	56	220	55.5	28.0	2.8		13.7
FY 1973 PHD'S	111	445	58.7	25.0	4.8		11.5
FY 1974 PHD'S	196	789	57.3	22.7	4.8	.9	14.3
FY 1975 PHD'S	535	1255	59.6	19.6	4.0	.1	16.8
NIH/ADAMHA/HRA PREDOCS	518	1435	61.0	21.1	2.0	.1	15.8
OTHER BIOMEDICAL PHD'S	413	1427	55.7	23.1	6.8	.5	14.0
MALE	680	2045	59.1	22.9	4.2	.1	13.7
FEMALE	251	817	56.4	20.0	4.8	.9	17.8

APP. B12 TENURED AND POSTDOCTORAL POSITIONS WITHIN THE ACADEMIC LABOR FORCE

PHD FIELD/YEAR/SUPPORT/SEX	EMPLOYED IN ACADEMIC SECTOR SURVEY RESP	EST TOTAL	PERCENT IN TENR POS	TENR TRACK	POST DOC	OTHER NONTENR	POSTDOC FRACTION OF TOTAL RES TIME[a]
TOTAL BIOMEDICAL SCIENCES	2882	9463	12.0	43.8	25.0	19.3	.424
ANIMAL SCIENCES	31	91	23.1	53.8	8.8	14.3	.195
BIOCHEM & MOLECULAR BIOL	530	2389	3.6	35.0	42.7	18.6	.569
BIOMATH/BIOSTATISTICS	73	137	14.9	57.5		27.6	.000
BIOMEDICAL ENGINEERING	99	169	10.8	43.7	13.8	31.7	.198
BIOPHYSICS	130	348	8.0	35.5	42.9	13.6	.601
CELL BIOLOGY	119	372	10.8	40.7	29.3	19.2	.472
DEVELOPMENTAL BIOLOGY	99	303	15.9	42.6	28.4	13.1	.450
ENVIRON HLTH & TOXICOLOGY	39	92	15.2	47.8	16.3	20.7	.361
EPIDEMIOLOGY	31	68	15.6	56.3		28.1	.000
EVOLUT & TAXONOMIC BIOL	32	145	24.1	42.8	9.7	23.4	.334
GENERAL BIOLOGY	102	467	22.8	51.5	11.6	14.0	.302
GENETICS	182	425	17.6	40.0	22.7	19.8	.433
IMMUNOLOGY	133	342	10.0	42.9	23.2	23.8	.331
MICROBIOLOGY	220	859	11.9	49.9	18.1	20.1	.343
MORPHOLOGICAL SCIENCES	130	355	20.9	51.5	8.4	19.2	.156
NEUROBIOLOGY	105	310	5.8	50.0	27.3	16.9	.402
NUTRITION & FOOD SCIENCES	36	159	17.9	51.9	12.2	17.9	.252
PATHOLOGY	84	180	23.3	44.2	8.1	24.4	.178
PHARMACOLOGY & PHARM SCI	247	660	14.1	48.4	20.4	17.1	.355
PHYSIOLOGY	272	1019	13.3	50.0	16.1	20.7	.318
PUBLIC HEALTH	45	96	15.6	59.4		25.0	.000
VIROLOGY	49	158	14.6	33.8	33.8	17.8	.463
BIOMEDICAL SCIENCES, OTHER	94	319	20.0	40.6	17.7	21.6	.331
FY 1971 PHD'S	480	1843	28.0	46.3	6.4	19.3	.118
FY 1972 PHD'S	471	1789	16.3	53.7	10.1	19.9	.191
FY 1973 PHD'S	529	1890	10.3	49.9	19.8	20.0	.356
FY 1974 PHD'S	533	1968	4.0	43.0	33.2	19.7	.532
FY 1975 PHD'S	869	1973	2.7	27.5	52.4	17.4	.733
NIH/ADAMHA/HRA PREDOCS	1512	4464	8.6	44.2	27.0	20.2	.431
OTHER BIOMEDICAL PHD'S	1370	4999	15.0	43.4	23.3	18.4	.417
MALE	2233	7297	13.1	47.1	22.8	17.0	.393
FEMALE	649	2166	8.2	32.5	32.5	26.8	.518

[a] Figures represent the postdoctoral proportion of the total manhours devoted to research by persons employed in academic sector.

APP. B13 POSTDOCTORAL APPOINTEES CURRENTLY IN HOLDING STATUS IN SEARCH OF EMPLOYMENT

	POSTDOCS		PERCENT INDICATING			PERCENT SEEKING JOB		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	TOTAL	APPT PRC LONGO	APPT OVER 36 MOS	TOTAL	DISSAT WITH APPT	APPT ENDS SOON
TOTAL BIOMEDICAL SCIENCES	950	2862	48.9	41.8	24.1	57.6	9.5	48.0
ANIMAL SCIENCES	3	8				37.5		37.5
BIOCHEM & MOLECULAR BIOL	310	1224	52.1	43.1	31.0	58.3	10.7	47.5
BIOMATH/BIOSTATISTICS								
BIOMEDICAL ENGINEERING	17	24	37.5	25.0	12.5	33.3	4.2	29.2
BIOPHYSICS	76	180	61.7	55.0	16.1	53.9	4.4	49.4
CELL BIOLOGY	45	126	30.2	30.2	7.1	63.5	11.1	52.4
DEVELOPMENTAL BIOLOGY	40	104	49.0	43.3	23.1	45.2		45.2
ENVIRON HLTH & TOXICOLOGY	7	18	38.9	38.9	33.3	44.4		44.4
EPIDEMIOLOGY								
EVOLUT & TAXONOMIC BIOL	3	17	82.4	82.4	41.2	82.4	41.2	41.2
GENERAL BIOLOGY	17	60	53.3	48.3	26.7	61.7	3.3	58.3
GENETICS	54	109	48.6	35.8	26.6	51.4	8.3	43.1
IMMUNOLOGY	51	104	26.9	24.0	11.5	35.6	11.5	24.0
MICROBIOLOGY	60	193	54.9	50.3	24.9	75.1	8.8	66.3
MORPHOLOGICAL SCIENCES	14	32	21.9	12.5	9.4	37.5		37.5
NEUROBIOLOGY	43	107	29.0	23.4	13.1	49.5	1.9	47.7
NUTRITION & FOOD SCIENCES	6	22	68.2	68.2		68.2	18.2	50.0
PATHOLOGY	12	20	80.0	60.0	65.0	40.0	15.0	25.0
PHARMACOLOGY & PHARM SCI	75	170	45.3	38.8	18.2	69.4	14.1	55.3
PHYSIOLOGY	62	191	50.3	42.9	21.5	60.7	9.4	51.3
PUBLIC HEALTH								
VIROLOGY	29	78	41.0	38.5	20.5	53.8	16.7	37.2
BIOMEDICAL SCIENCES, OTHER	26	75	52.0	49.3	12.0	52.0	10.7	41.3
FY 1971 PHD'S	35	153	78.4	50.3	78.4	51.6	16.3	35.3
FY 1972 PHD'S	57	220	90.9	68.6	71.8	65.5	20.0	45.5
FY 1973 PHD'S	114	445	72.8	59.1	62.0	55.1	12.8	42.2
FY 1974 PHD'S	200	789	50.1	43.7	17.1	57.9	7.9	50.1
FY 1975 PHD'S	544	1255	28.8	28.8		57.6	6.8	50.8
NIH/ADAMHA/HRA PREDOCS	527	1435	48.7	40.2	26.5	59.0	7.9	51.1
OTHER BIOMEDICAL PHD'S	423	1427	49.1	43.4	21.7	56.2	11.2	45.0
MALE	695	2045	50.8	43.8	25.5	59.4	9.5	49.8
FEMALE	255	817	44.2	37.0	20.4	53.1	9.5	43.6

APP. B14 LENGTH OF POSTDOCTORAL APPOINTMENTS HELD BY PERSONS TAKING APPOINTMENTS WITHIN A YEAR AFTER GRADUATION

	HELD POSTDOC		PERCENT ON APPT LONGER THAN					
FISCAL YEAR OF PHD	SURVEY RESP	EST TOTAL	1 YR	2 YRS	3 YRS	4 YRS	5 YRS	EST TOTAL NUMBER ON POSTDOC APPT[a]
1971 PHD'S	502	2404	79.1	41.8	19.9	10.1	7.2	
1972 PHD'S	525	2401	76.8	41.3	21.0	8.5		3039
1973 PHD'S	544	2183	78.1	45.3	24.2			3539
1974 PHD'S	570	2459	80.0	52.9				3577
1975 PHD'S	1039	2638	75.9					4455

[a] The numbers of persons holding postdoctoral appointments in (February) 1972-75 was estimated from data collected in the 1973 and 1975 Surveys of Doctoral Scientists and Engineers. The large differences between the 1974 and 1975 figures can be attributed to the impoundment and subsequent release of federal training funds in the preceding years.

APP. B15 RELEVANCE OF CURRENT EMPLOYMENT FIELD TO DOCTORATE FIELD

	ALL EMPLOYED		PERCENT EMPLOYED IN			PERCENT INDICATING FIELDS RELATED		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	PHD SPCLTY FIELD	PhD BROAD FIELD	OTHER FIELD	CLOSE LY	SOME WHAT	NOT AT ALL
TOTAL BIOMEDICAL SCIENCES	4160	13671	61.0	31.5	7.6	70.1	25.5	4.5
ANIMAL SCIENCES	44	123	66.7	30.9	2.4	75.7	18.7	1.6
BIOCHEM & MOLECULAR BIOL	740	3448	61.8	31.4	6.8	66.1	28.7	5.2
BIOMATH/BIOSTATISTICS	116	217	81.0	9.7	9.3	86.2	10.6	3.2
BIOMEDICAL ENGINEERING	167	284	62.6	19.1	18.3	66.5	24.3	9.2
BIOPHYSICS	215	586	37.5	46.1	16.4	49.3	39.2	11.5
CELL BIOLOGY	144	470	54.1	43.7	2.2	69.8	25.5	4.7
DEVELOPMENTAL BIOLOGY	117	365	45.3	50.8	3.8	68.7	27.5	3.8
ENVIRON HLTH & TOXICOLOGY	104	236	64.0	25.0	11.0	70.3	24.6	5.2
EPIDEMIOLOGY	47	99	78.1	15.6	6.3	76.8	21.2	2.0
EVOLUT & TAXONOMIC BIOL	40	180	52.8	31.1	16.1	67.2	25.0	7.8
GENERAL BIOLOGY	152	698	68.8	23.3	7.8	72.1	22.8	5.1
GENETICS	232	534	53.8	37.8	8.5	64.4	30.3	5.2
IMMUNOLOGY	183	480	69.5	26.2	4.3	73.4	22.2	4.4
MICROBIOLOGY	344	1358	59.7	37.3	3.0	69.1	27.4	3.6
MORPHOLOGICAL SCIENCES	150	402	58.8	30.3	11.0	76.6	20.6	2.8
NEUROBIOLOGY	124	357	61.6	30.2	8.2	76.2	21.0	2.8
NUTRITION & FOOD SCIENCES	44	196	74.1	23.3	2.6	80.6	19.4	
PATHOLOGY	126	256	71.4	25.5	3.1	82.9	15.5	1.6
PHARMACOLOGY & PHARM SCI	420	1136	70.3	22.8	7.0	73.0	24.0	3.0
PHYSIOLOGY	357	1361	61.5	30.3	8.1	75.3	21.0	3.7
PUBLIC HEALTH	83	153	44.9	20.8	34.3	73.3	26.7	
VIROLOGY	79	260	73.0	25.4	1.6	85.8	7.7	6.5
BIOMEDICAL SCIENCES, OTHER	132	432	44.9	45.8	9.3	66.6	32.5	.9
FY 1971 PHD'S	684	2676	61.6	32.6	5.8	70.6	25.3	4.2
FY 1972 PHD'S	715	2709	60.4	32.5	7.1	68.8	26.2	5.0
FY 1973 PHD'S	764	2706	60.3	30.8	8.9	71.7	23.4	4.8
FY 1974 PHD'S	780	2840	64.3	27.9	7.7	69.5	25.7	4.8
FY 1975 PHD'S	1217	2740	58.0	33.7	8.3	65.8	26.6	3.6
NIH/ADAMHA/HRA PREDOCS	2067	6139	60.7	32.2	7.1	70.5	26.1	3.4
OTHER BIOMEDICAL PHD'S	2093	7532	61.2	30.9	7.9	69.8	24.9	5.3
MALE	3346	10523	61.6	30.7	7.7	70.9	24.3	4.8
FEMALE	814	2748	58.5	34.6	6.9	66.8	30.2	3.0

APP. B16 RELEVANCE OF CURRENT POSTDOCTORAL FIELD TO DOCTORATE FIELD

PHD FIELD/YEAR/SUPPORT/SEX	POSTDOCS SURVEY RESP	POSTDOCS EST TOTAL	PERCENT STUDYING IN PHD SPCLTY FIELD	PERCENT STUDYING IN PHD BROAD FIELD	PERCENT STUDYING IN OTHER FIELD	PERCENT INDICATING FIELDS RELATED CLOSELY	PERCENT INDICATING FIELDS RELATED SOMEWHAT	PERCENT INDICATING FIELDS RELATED NOT AT ALL
TOTAL BIOMEDICAL SCIENCES	940	2862	57.7	39.2	3.1	68.6	29.0	2.3
ANIMAL SCIENCES	3	8	37.5	62.5		62.5	37.5	
BIOCHEM & MOLECULAR BIOL	307	1224	70.5	27.3	2.2	72.7	25.7	1.6
BIOMATH/BIOSTATISTICS								
BIOMEDICAL ENGINEERING	17	24	45.8	45.8	8.3	79.2	20.8	
BIOPHYSICS	75	180	46.6	48.3	5.1	58.9	38.3	2.8
CELL BIOLOGY	44	126	43.9	56.1		59.7	35.5	4.8
DEVELOPMENTAL BIOLOGY	39	104	46.6	53.4		65.0	32.0	2.9
ENVIRON HLTH & TOXICOLOGY	7	18	44.4	38.9	16.7	38.9	27.8	33.3
EPIDEMIOLOGY								
EVOLUT & TAXONOMIC BIOL	3	17	41.2	17.6	41.2	41.2	58.8	
GENERAL BIOLOGY	17	60	31.7	63.3	5.0	58.3	41.7	
GENETICS	54	109	39.4	56.0	4.6	65.1	33.0	1.8
IMMUNOLOGY	50	104	82.8	17.2		74.0	26.0	
MICROBIOLOGY	60	193	32.6	67.4		49.7	45.1	5.2
MORPHOLOGICAL SCIENCES	14	32	31.3	68.8		59.4	40.6	
NEUROBIOLOGY	42	107	69.2	24.0	6.7	81.3	18.7	
NUTRITION & FOOD SCIENCES	6	22	72.7	18.2	9.1	81.8	18.2	
PATHOLOGY	12	20	25.0	75.0		77.8	22.2	
PHARMACOLOGY & PHARM SCI	75	170	42.9	50.0	7.1	56.5	41.2	2.4
PHYSIOLOGY	60	191	54.3	42.4	3.3	83.8	13.1	3.1
PUBLIC HEALTH								
VIROLOGY	26	78	65.4	34.6		83.3	11.5	5.1
BIOMEDICAL SCIENCES, OTHER	26	75	40.0	54.7	5.3	64.0	33.3	2.7
FY 1971 PHD'S	34	153	61.5	32.4	6.1	79.1	20.9	
FY 1972 PHD'S	57	220	48.2	50.5	.9	55.0	40.4	4.6
FY 1973 PHD'S	113	445	55.7	41.9	2.5	71.2	26.5	2.2
FY 1974 PHD'S	198	789	63.9	33.6	2.6	69.5	28.3	2.3
FY 1975 PHD'S	538	1255	55.8	40.5	3.6	68.3	29.4	2.3
NIH/ADAMHA/HRA PREDOCS	523	1435	56.0	41.5	2.5	68.9	29.0	2.1
OTHER BIOMEDICAL PHD'S	417	1427	59.5	36.9	3.6	68.4	29.0	2.6
MALE	688	2045	57.6	39.2	3.2	71.1	26.4	2.5
FEMALE	252	817	57.9	39.2	2.8	62.6	35.6	1.8

APP. B17 NET MOBILITY AMONG PH.D. AND EMPLOYMENT SPECIALTY FIELDS

FIELD OF PHD/EMPLOYMENT	PHD'S AWARDED		CURRENTLY NOT EMPLOYED		SWITCH OUT OF FIELD		SWITCH INTO FIELD		TOTAL EMPLOYED IN FIELD	
	SURVEY RESP	EST TOTAL	N	%	N	%	N	%	N	%
TOTAL BIOMEDICAL SCIENCES	4344	14288	617	4.3	5228	36.6	5542	38.8	13985	97.9
ANIMAL SCIENCES	45	126	3	2.4	41	32.5	107	84.9	189	150.0
BIOCHEM & MOLECULAR BIOL	778	3616	168	4.6	1286	35.6	739	20.4	2901	80.2
BIOMATH/BIOSTATISTICS	118	221	4	1.8	41	18.6	169	76.5	345	156.1
BIOMEDICAL ENGINEERING	170	289	5	1.7	104	36.0	60	20.8	240	83.0
BIOPHYSICS	222	604	18	3.0	350	57.9	169	28.0	405	67.1
CELL BIOLOGY	151	505	35	6.9	210	41.6	310	61.4	570	112.9
DEVELOPMENTAL BIOLOGY	126	392	27	6.9	199	50.8	129	32.9	295	75.3
ENVIRON HLTH & TOXICOLOGY	106	240	4	1.7	85	35.4	333	138.8	484	201.7
EPIDEMIOLOGY	50	108	9	8.3	21	19.4	78	72.2	156	144.4
EVOLUT & TAXONOMIC BIOL	41	184	4	2.2	85	46.2	25	13.6	120	65.2
GENERAL BIOL & ECOLOGY	154	703	5	.7	215	30.6	359	51.1	842	119.8
GENETICS	251	579	45	7.8	240	41.5	162	28.0	456	78.8
IMMUNOLOGY	192	502	22	4.4	143	28.5	373	74.3	710	141.4
MICROBIOLOGY	353	1395	37	2.7	540	38.7	218	15.6	1036	74.3
MORPHOLOGICAL SCIENCES	162	435	33	7.6	165	37.9	159	36.6	396	91.0
NEUROBIOLOGY	130	375	18	4.8	136	36.3	326	86.9	547	145.9
NUTRITION & FOOD SCIENCES	46	206	10	4.9	49	23.8	105	51.0	252	122.3
PATHOLOGY	130	265	9	3.4	73	27.5	136	51.3	319	120.4
PHARMACOLOGY & PHARM SCI	435	1170	34	2.9	332	28.4	371	31.7	1175	100.4
PHYSIOLOGY	379	1445	84	5.8	510	35.3	269	18.6	1120	77.5
PUBLIC HEALTH	85	198	5	2.5	98	49.5	116	58.6	211	106.6
VIROLOGY	84	282	22	7.8	68	24.1	208	73.8	400	141.8
BIOMEDICAL SCIENCES, OTHER	136	448	16	3.6	237	52.9	621	138.6	816	182.1

APP. B10.1 PRIMARY SOURCES OF SUPPORT IN FIRST AND SECOND YEARS OF GRADUATE SCHOOL

	ALL PHD'S		PERCENT SUPPORTED IN FIRST YEAR BY						PERCENT SUPPORTED IN SECOND YEAR BY					
			--TRG/FELL--		FEDL	UNIV			--TRG/FELL--		FEDL	UNIV		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKNOWN	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKNOWN
TOTAL BIOMEDICAL SCIENCES	4403	14288	28.9	15.3	5.5	32.5	13.0	4.8	34.5	18.2	8.0	28.3	6.3	4.8
ANIMAL SCIENCES	45	126	11.1	7.1	11.9	50.0	11.9	7.9	19.0	9.5	22.2	41.3	4.0	4.0
BIOCHEM & MOLECULAR BIOL	793	3616	34.7	15.7	5.4	30.1	8.7	5.3	40.9	18.4	9.7	21.8	3.5	5.7
BIOMATH/BIOSTATISTICS	117	221	39.6	11.5	5.5	24.0	13.9	5.5	48.8	10.1	5.1	18.4	12.4	5.1
BIOMEDICAL ENGINEERING	174	289	32.2	18.0	8.3	22.8	14.5	4.2	43.9	13.6	9.4	16.0	11.1	5.9
BIOPHYSICS	230	604	37.7	15.1	6.5	28.1	9.3	3.3	45.5	13.6	6.3	24.9	5.0	2.7
CELL BIOLOGY	156	505	24.8	20.4	2.4	29.4	15.0	8.0	32.2	27.2	1.8	25.0	4.4	9.4
DEVELOPMENTAL BIOLOGY	127	392	15.8	22.2	2.3	43.4	15.8	.5	17.7	25.4	1.0	50.9	3.9	1.0
ENVIRON HLTH & TOXICOLOGY	105	240	22.3	49.2	8.4	5.5	7.1	7.6	25.2	48.3	11.3	5.0	4.6	5.5
EPIDEMIOLOGY	51	108	46.7	14.3	9.5	14.3	11.4	3.8	57.1	10.5	9.5	14.3	4.8	3.8
EVOLUT & TAXONOMIC BIOL	41	184	.5	23.4	7.1	44.0	16.3	8.7	5.0	26.8	10.6	43.6	9.5	4.5
GENERAL BIOLOGY	155	703	3.6	18.0	7.6	46.9	17.9	6.0	5.4	25.3	8.7	49.5	5.8	5.3
GENETICS	255	579	24.8	14.2	6.9	36.2	14.4	3.5	32.8	14.9	9.0	35.0	5.9	2.4
IMMUNOLOGY	196	502	40.8	5.4	.6	33.9	15.7	3.6	46.4	8.8	4.8	24.9	6.8	4.4
MICROBIOLOGY	355	1395	27.5	13.0	6.4	37.7	12.0	3.3	28.7	18.6	9.7	32.4	7.3	3.3
MORPHOLOGICAL SCIENCES	160	435	32.6	14.6	1.6	26.8	22.3	2.1	33.7	17.2	7.2	30.2	8.8	2.8
NEUROBIOLOGY	130	375	23.6	13.1	7.8	38.9	9.7	7.0	31.0	22.1	8.6	28.8	5.4	4.0
NUTRITION & FOOD SCIENCES	45	206	21.9	16.1	1.6	36.5	18.8	5.2	21.4	23.4	3.1	32.8	12.0	7.3
PATHOLOGY	130	265	42.6	9.5	5.3	22.1	10.3	10.3	48.5	11.9	6.5	13.5	9.6	10.0
PHARMACOLOGY & PHARM SCI	440	1170	35.1	12.0	3.8	31.5	11.9	5.7	38.2	14.7	6.1	28.1	6.6	6.3
PHYSIOLOGY	389	1445	21.7	12.3	6.1	36.7	18.5	4.6	31.6	15.6	6.0	35.6	8.0	3.3
PUBLIC HEALTH	87	198	24.0	30.6	5.1	9.2	24.5	6.6	29.7	31.8	2.6	8.3	20.3	7.3
VIROLOGY	85	282	43.3	12.0	10.2	25.1	6.9	2.5	50.4	11.8	13.2	20.0	2.1	2.5
BIOMEDICAL SCIENCES, OTHER	137	448	26.3	17.2	5.1	33.0	16.1	2.2	33.6	14.6	8.3	27.1	11.9	4.5
FY 1971 PHD'S	720	2792	31.0	12.1	4.2	33.6	13.1	6.1	37.3	16.8	7.0	27.8	5.8	5.2
FY 1972 PHD'S	760	2842	29.4	16.2	6.7	28.5	14.0	5.1	34.6	19.5	8.3	26.6	6.1	4.8
FY 1973 PHD'S	798	2799	28.8	17.8	5.8	32.7	11.3	3.6	34.2	19.5	9.1	29.0	5.1	3.0
FY 1974 PHD'S	837	2982	27.1	15.3	5.2	34.4	12.8	5.1	33.0	18.0	7.4	28.2	7.2	6.2
FY 1975 PHD'S	1288	2873	28.3	15.2	5.6	32.9	13.8	4.2	33.9	17.0	8.0	29.7	7.2	4.5
NIH/ADAMHA/HRA PREDOCS	2203	6425	64.0	6.2	1.8	19.1	6.8	2.1	76.4	6.4	2.7	11.2	2.0	1.3
OTHER BIOMEDICAL PHD'S	2230	7863		22.8	8.5	43.5	18.1	7.1		27.9	12.3	42.4	9.9	7.6
MALE	3500	11243	28.0	14.7	5.9	33.5	13.0	4.9	33.9	17.6	8.5	29.0	6.1	4.9
FEMALE	903	3045	32.3	17.5	3.9	28.7	13.1	4.4	36.8	20.2	5.9	25.8	7.1	4.2

APP. B18.3 PRIMARY SOURCES OF SUPPORT IN THIRD AND FOURTH YEARS OF GRADUATE SCHOOL

	ALL PHD'S		PERCENT SUPPORTED IN THIRD YEAR BY						PERCENT SUPPORTED IN FOURTH YEAR BY					
			--TRG/FELL--		FEDL	UNIV			--TRG/FELL--		FEDL	UNIV		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKN	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKN
TOTAL BIOMEDICAL SCIENCES	4376	14288	36.9	19.2	9.6	24.0	5.7	4.7	37.9	15.7	10.7	23.0	6.7	6.3
ANIMAL SCIENCES	45	126	19.8	23.0	22.2	26.2	4.0	4.8	15.9	15.0	28.3	28.3	4.4	8.0
BIOCHEM & MOLECULAR BIOL	795	3616	41.1	20.0	11.2	18.9	3.3	5.6	42.7	15.0	12.8	18.1	3.7	7.7
BIOMATH/BIOSTATISTICS	116	221	56.3	9.3	4.2	16.7	6.5	7.0	53.0	9.5	7.0	12.5	9.0	9.0
BIOMEDICAL ENGINEERING	172	289	47.7	9.8	13.0	15.8	9.8	3.9	50.9	6.5	12.6	13.7	10.1	6.1
BIOPHYSICS	228	604	51.4	13.2	10.2	16.2	5.3	3.7	52.3	9.8	10.5	18.1	4.4	4.9
CELL BIOLOGY	157	505	39.2	27.1	3.4	20.2	3.0	7.1	43.0	20.2	5.5	20.2	4.8	6.4
DEVELOPMENTAL BIOLOGY	126	392	24.9	22.1	4.4	41.1	6.4	1.0	28.0	18.3	8.1	35.8	7.0	2.7
ENVIRON HLTH & TOXICOLOGY	102	240	24.2	44.6	13.0	5.2	6.5	6.5	23.6	37.3	14.2	8.5	9.9	6.6
EPIDEMIOLOGY	50	108	63.5	11.5	8.7	8.7	3.8	3.8	49.4	7.4	7.4	18.5	12.3	4.9
EVOLUT & TAXONOMIC BIOL	40	184	4.5	34.1	14.5	37.4	7.8	1.7	6.9	26.0	17.9	42.8	2.9	3.5
GENERAL BIOLOGY	155	703	5.4	23.3	15.6	45.9	4.0	5.9	7.7	19.5	17.3	41.4	5.4	8.7
GENETICS	234	579	39.1	15.8	9.2	27.5	5.4	3.0	42.6	15.0	8.0	24.8	6.2	3.4
IMMUNOLOGY	194	502	46.7	10.4	8.1	24.5	6.5	3.9	42.4	8.7	9.8	26.7	5.9	6.6
MICROBIOLOGY	352	1395	33.0	19.9	10.3	27.3	5.9	3.6	34.6	19.7	11.2	23.8	7.0	3.7
MORPHOLOGICAL SCIENCES	161	435	37.2	15.8	5.6	29.1	9.5	2.8	39.0	13.1	4.7	29.1	11.5	2.6
NEUROBIOLOGY	129	375	38.0	24.8	5.9	22.1	6.2	3.0	45.3	17.8	7.4	18.3	9.2	2.1
NUTRITION & FOOD SCIENCES	45	206	19.0	22.6	15.4	29.2	11.8	2.1	19.8	13.2	11.4	32.9	16.2	6.6
PATHOLOGY	127	265	47.3	10.2	7.4	15.6	10.2	9.4	47.6	6.7	7.6	16.2	12.4	9.5
PHARMACOLOGY & PHARM SCI	440	1170	40.6	14.7	7.5	24.2	5.6	7.4	42.0	11.7	6.3	24.1	6.9	9.0
PHYSIOLOGY	385	1445	35.3	18.4	7.5	30.4	6.2	2.3	33.4	17.4	7.9	28.3	8.9	4.1
PUBLIC HEALTH	82	198	24.2	28.5	2.7	8.1	28.0	8.6	26.4	16.7	6.3	12.5	31.3	6.9
VIROLOGY	86	262	48.9	18.2	9.3	17.1	.4	6.1	52.9	20.2	10.9	11.7	.4	3.9
BIOMEDICAL SCIENCES, OTHER	135	448	35.1	21.2	11.4	21.4	8.9	2.1	29.7	17.8	16.5	20.7	9.7	5.6
FY 1971 PHD'S	717	2792	41.3	20.2	7.6	21.7	4.2	4.9	43.1	19.2	8.3	18.6	3.9	6.8
FY 1972 PHD'S	757	2842	40.4	18.8	10.6	20.7	5.6	3.9	41.6	15.9	13.1	18.7	5.8	4.9
FY 1973 PHD'S	793	2759	35.4	20.6	10.9	24.5	4.6	4.0	36.2	16.4	11.3	24.3	6.2	5.5
FY 1974 PHD'S	827	2982	33.4	20.0	9.0	26.0	6.8	4.8	32.9	15.4	9.8	27.0	8.5	6.4
FY 1975 PHD'S	1282	2873	34.3	16.5	9.6	27.0	7.0	5.6	35.9	12.0	10.8	25.8	8.9	6.6
NIH/ADAMHA/HRA PREDOCS	2190	6425	81.7	6.1	2.7	6.7	1.4	1.4	83.6	3.4	3.2	5.6	1.9	2.2
OTHER BIOMEDICAL PHD'S	2186	7863		30.0	15.2	38.3	9.2	7.3		25.9	16.8	37.3	10.7	9.3
MALE	3478	11243	36.5	18.8	10.1	24.4	5.4	4.8	37.5	16.1	11.1	23.1	6.0	6.1
FEMALE	898	3045	38.3	20.8	7.5	22.7	6.7	4.1	39.3	14.4	8.9	22.5	9.3	5.7

APP. B19 DEPENDENCE ON FEDERAL SUPPORT TO COMPLETE PHD PROGRAM

PHD FIELD/YEAR/SUPPORT/SEX	RECEIVED SOME FEDL SUPPORT		PERCENT WHO WITHOUT SUPPORT FELT THEY COULD		
	SURVEY RESP	EST TOTAL	EARN PHD	NOT EARN PHD	UNCERTAIN
TOTAL BIOMEDICAL SCIENCES	3601	11402	13.7	62.9	23.4
ANIMAL SCIENCES	29	86	9.3	80.2	10.5
BIOCHEM & MOLECULAR BIOL	688	3058	11.9	66.9	21.3
BIOMATH/BIOSTATISTICS	100	187	7.0	59.4	33.7
BIOMEDICAL ENGINEERING	150	245	12.7	63.3	24.1
BIOPHYSICS	198	506	11.1	67.6	21.3
CELL BIOLOGY	133	429	12.1	61.1	26.8
DEVELOPMENTAL BIOLOGY	94	265	10.2	73.6	16.2
ENVIRON HLTH & TOXICOLOGY	101	229	8.7	68.6	22.7
EPIDEMIOLOGY	47	97	5.2	70.1	24.7
EVOLUT & TAXONOMIC BIOL	34	153	15.7	54.9	29.4
GENERAL BIOLOGY	113	476	20.4	50.4	29.2
GENETICS	207	460	13.3	66.5	20.2
IMMUNOLOGY	155	386	23.6	58.3	18.1
MICROBIOLOGY	291	1106	12.7	62.9	24.4
MORPHOLOGICAL SCIENCES	112	305	10.2	65.9	23.9
NEUROBIOLOGY	112	305	15.1	57.0	27.9
NUTRITION & FOOD SCIENCES	34	137	6.6	65.0	28.5
PATHOLOGY	108	215	11.6	72.1	16.3
PHARMACOLOGY & PHARM SCI	321	842	12.9	60.9	26.1
PHYSIOLOGY	315	1139	18.3	57.0	24.8
PUBLIC HEALTH	78	179	24.0	51.4	24.6
VIROLOGY	74	246	23.2	58.9	17.9
BIOMEDICAL SCIENCES, OTHER	107	351	11.7	57.3	31.1
FY 1971 PHD'S	616	2296	13.2	61.5	25.3
FY 1972 PHD'S	639	2350	13.4	67.7	18.9
FY 1973 PHD'S	670	2282	14.5	60.7	24.8
FY 1974 PHD'S	672	2305	12.8	64.8	22.4
FY 1975 PHD'S	1004	2169	14.4	59.6	26.0
NIH/ADAMHA/HRA PREDOCS	2182	6355	10.5	67.5	22.0
OTHER BIOMEDICAL PHD'S	1419	5047	17.6	57.1	25.3
MALE	2866	9009	14.6	61.9	23.4
FEMALE	735	2393	10.0	66.6	23.4

APP. 320 INFLUENCE OF THE AVAILABILITY OF FINANCIAL ASSISTANCE ON THE SELECTION OF A PH.D. PROGRAM

	ALL PHD'S		PERCENT INDICATING AVAILABILITY HAD		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	SOME EFFECT	NO EFFCT	UNCERTAIN
TOTAL BIOMEDICAL SCIENCES	4377	14288	33.9	59.6	6.4
ANIMAL SCIENCES	45	126	43.7	52.4	4.0
BIOCHEM & MOLECULAR BIOL	794	3616	33.0	59.7	7.3
BIOMATH/BIOSTATISTICS	119	221	47.1	44.3	8.6
BIOMEDICAL ENGINEERING	171	289	37.0	57.4	5.6
BIOPHYSICS	230	604	32.9	56.5	10.6
CELL BIOLOGY	156	505	38.0	54.1	7.8
DEVELOPMENTAL BIOLOGY	124	392	26.4	66.8	6.9
ENVIRON HLTH & TOXICOLOGY	103	240	62.7	34.8	2.6
EPIDEMIOLOGY	51	108	38.7	55.7	5.7
EVOLUT & TAXONOMIC BIOL	41	184	25.0	69.6	5.4
GENERAL BIOLOGY	153	703	20.5	73.9	5.5
GENETICS	255	579	30.9	63.7	5.4
IMMUNOLOGY	194	502	35.6	60.5	3.8
MICROBIOLOGY	356	1395	26.6	67.5	5.9
MORPHOLOGICAL SCIENCES	159	435	38.7	56.6	4.7
NEUROBIOLOGY	130	375	27.8	62.4	9.7
NUTRITION & FOOD SCIENCES	46	206	34.7	58.8	6.5
PATHOLOGY	129	265	48.8	45.8	5.4
PHARMACOLOGY & PHARM SCI	435	1170	40.3	54.0	5.6
PHYSIOLOGY	380	1445	33.9	60.4	5.7
PUBLIC HEALTH	85	198	39.3	58.1	2.6
VIROLOGY	86	282	23.8	68.6	7.6
BIOMEDICAL SCIENCES, OTHER	135	448	45.0	48.2	6.8
FY 1971 PHD'S	719	2792	34.5	60.0	5.5
FY 1972 PHD'S	761	2842	39.2	53.5	7.4
FY 1973 PHD'S	787	2799	31.7	60.2	8.0
FY 1974 PHD'S	829	2982	30.5	63.2	6.3
FY 1975 PHD'S	1281	2873	33.8	61.2	5.0
NIH/ADAMHA/HRA PREDOCS	2203	6425	37.5	55.7	6.8
OTHER BIOMEDICAL PHD'S	2174	7863	30.9	63.0	6.1
MALE	3480	11243	33.6	59.7	6.7
FEMALE	897	3045	35.0	59.6	5.4

APP. B21 TRENDS IN U.S. DOCTORATE PRODUCTION IN THE BIOMEDICAL SCIENCES
(FIGURES EXCLUDE DEGREES AWARDED TO PERSONS PLANNING FOREIGN EMPLOYMENT)

	FISCAL YEAR OF DOCTORATE																
FIELD OF DOCTORATE	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
TOTAL BIOMEDICAL SCIENCES	973	974	1121	1201	1379	1516	1725	1972	2319	2573	2871	3188	3176	3273	3195	3286	3371
ANATOMY & EMBRYOLOGY	32	42	51	59	71	94	97	115	115	149	157	179	183	148	138	138	142
ANIMAL PHYSIOLOGY	111	114	116	123	160	174	171	222	263	295	310	339	307	331	287	314	269
BIOCHEM & MOLECULAR BIOL	237	239	250	282	334	347	401	458	532	577	619	690	680	700	696	721	721
BIOMATH/BIOSTATISTICS	11	6	8	10	19	19	19	23	18	17	32	38	26	31	29	33	40
BIOMEDICAL ENGINEERING										34	44	67	72	66	59	72	69
BIOPHYSICS	18	22	24	30	31	45	60	79	92	100	99	93	98	100	111	102	112
ENVIRONMENTAL SCIENCES													66	84	96	130	119
GENERAL BIOLOGY	10	2	10	2	6	3	11	23	52	89	115	155	126	185	179	176	176
GENETICS	58	58	65	84	76	77	91	118	129	108	127	128	140	107	109	135	130
IMMUNOLOGY													15	49	61	64	88
MICROBIOLOGY	166	151	181	180	170	241	255	313	331	350	364	372	359	378	381	358	356
PATHOLOGY	7	21	20	20	29	32	34	41	49	37	34	60	65	72	73	62	83
PHARMACOLOGY & PHARM SCI	98	102	137	139	147	166	186	195	220	236	232	290	272	258	282	278	305
PUBLIC HEALTH	20	21	20	17	34	31	50	50	58	74	79	84	76	91	117	101	106
VETERINARY MEDICINE	6	12	17	19	23	27	34	27	34	29	32	29	31	21	26	21	27
ZOOLOGY	160	142	169	172	192	190	240	211	287	259	314	327	329	308	244	247	241
BIOSCIENCES, OTHER	28	18	27	37	45	39	49	56	96	172	215	191	190	233	205	230	281
MEDICAL SCIENCES, OTHER	11	24	26	27	42	31	27	41	43	47	98	146	119	111	102	104	106

SOURCE: NRC, Survey of Earned Doctorates, Washington, D.C., 1960-76.

APPENDIX C

SURVEY RESPONSE TO THE 1976 SURVEY OF BIOMEDICAL AND BEHAVIORAL SCIENTISTS

APPENDIX C1

1976 SURVEY OF BIOMEDICAL AND BEHAVIORAL SCIENTISTS

The purpose of this survey was to obtain detailed information on the training and subsequent utilization of recent doctorate recipients in biomedical and behavioral disciplines. Survey findings are described in Appendixes B and E, as well as in Chapter 3. The questionnaire used in the survey has been included at the end of this section. It was sent to 14,300 persons who had earned research doctorates (Ph.D. or equivalent) between FY 1971 and FY 1975 in biomedical, behavioral, and other health-related fields.[1] These persons represented a total population of 38,400 graduates who earned similar degrees and had indicated their intention to remain in the U.S. labor force after graduation.[2] In selecting the survey sample a stratified design with disproprotionate sampling was used in order to maximize reliability in reporting differences by year and specialty area of degree, sex, and source of predoctoral support (see Appendixes C2 and C3).

An overall response rate of almost 71 percent was obtained. Approximately 1,600 of the 10,113 survey responses were from persons who indicated either that their doctorate was not in a biomedical or behavioral discipline (as defined in the survey taxonomy) or that they were currently employed in a foreign country. Their responses were not included in the data reported in Appendixes B and E. Of the 4,100 persons who did not respond to the survey, at least 40 percent could not be reached through available addresses.[3] A detailed comparison of survey respondents and nonrespondents was made on the basis of information that had been collected at the time they had received their doctorates. Findings from this comparison are given in Appendixes C2-C5. The following groups of individuals were found to have been less likely to respond to the survey:

(1) Graduates in related fields not generally considered to be biomedical or behavioral sciences (Appendix C2);

(2) Males, earlier graduates, and those who had not received NIH predoctoral support (Appendix C3);

(3) Persons categorized as foreign according to citizenship, birthplace, and/or baccalaureate training (Appendix C4);

(4) Graduates who at the time they received their doctorate did not have a definite commitment for prospective employment (Appendix C5);

(5) Graduates planning to be employed in the business sector (Appendix C5).

Only the response rate for the foreign group was considered significantly low enough to have possibly prejudiced findings from the survey. However, it is suspected that many of the foreign nonrespondents have not remained in this country and should not have been included in the original population. In looking for other sources of response bias, the Committee considered the possibility that either unemployed or underutilized graduates might have been significantly less likely to complete the questionnaire. Although the evidence available* in Appendix C5 suggests that this was not an important source of bias, a follow-up of approximately 100 nonresponse cases is being made. Results from this follow-up are not yet available.

In order to examine the current employment market for nurses with recently earned doctorates, the same questionnaire was sent to 495 nurses who represented a total of 558 individuals who had earned doctorates between 1971 and 1975. Findings for this survey group are reported in Appendix I. Since an overall response of more than 78 percent was obtained from only two survey mailings, the Committee felt that an investigation of potential nonresponse bias was not needed.

FOOTNOTES

1. Graduates from chemistry (organic and other specialties), econometrics, operations research, and statistics were included in the survey sample since in the past many individuals from these fields have moved into areas of biomedical and behavioral research.

2. Approximately 10 percent of the recent Ph.D. recipients in biomedical and behavioral fields have indicated that they planned to find employment in a foreign country.

3. It is suspected that the actual percentage not contacted may exceed 60 percent of the total nonresponse.

4. It should be noted that the response rate for those still seeking a job at the time they received their doctorates was no greater than the rate for those who were negotiating contracts at this time. Neither of these response rates was substantially below the rate for those who had definite employment commitments at graduation.

APP. C2 SURVEY RESPONSE BY FIELD OF DOCTORATE[a]

			PERCENT RESPONDING TO SURVEY					PERCENT NOT RESPONDING		
FIELD OF DOCTORATE	POPULATION N	SAMPLE N	TOTAL	BIO/ BEH PHD	OTHER PHD FIELD	FRGN EMPL	DECEASED	TOTAL	NO RETRN	NOT REACHED
TOTAL	38377	14279	70.8	59.4	9.5	1.6	.3	29.2	16.4	12.8
BIOMEDICAL RELATED FIELDS	19845	7784	71.6	58.0	11.4	1.9	.3	28.4	14.2	14.2
ANATOMY	778	423	70.2	65.7	3.3	1.2		29.8	18.2	11.6
ANIMAL PHYSIOLOGY	1564	550	74.0	69.8	2.2	1.8	.2	26.0	15.1	10.9
BIOCHEMISTRY	2831	629	73.6	70.6	1.1	1.9		26.4	11.8	14.6
BIOMEDICAL ENGINEERING	323	270	73.0	66.3	5.2	1.5		27.0	10.4	16.7
BIOMATH/BIOSTATISTICS	151	131	74.8	68.7	1.5	3.8	.8	25.2	13.7	11.5
BIOPHYSICS	499	343	70.0	64.1	2.9	2.6	.3	30.0	12.2	17.8
ENVIRONMENTAL SCIENCES	367	273	65.6	28.9	35.9	.4	.4	34.4	15.4	19.0
GENETICS	601	371	77.1	70.4	2.4	3.5	.8	22.9	12.7	10.2
IMMUNOLOGY	188	160	78.8	75.6	.6	1.9	.6	21.3	9.4	11.9
MICROBIOLOGY	1820	573	74.9	71.2	1.4	2.1	.2	25.1	12.7	12.4
MOLECULAR BIOLOGY	592	383	75.2	70.5	2.1	2.1	.5	24.8	11.7	13.1
ORGANIC CHEMISTRY	3087	550	69.3	2.9	65.5	.9		30.7	17.8	12.9
PATHOLOGY	348	242	69.8	66.5	1.2	1.2	.8	30.2	13.2	16.9
PHARMACEUTICAL SCIENCES	552	318	67.3	51.6	14.2	1.6		32.7	15.7	17.0
PHARMACOLGY	793	428	70.6	66.8	1.6	1.4	.7	29.4	15.9	13.6
PUBLIC HEALTH	449	311	68.8	56.9	8.4	3.2	.3	31.2	15.8	15.4
VETERINARY MEDICINE	120	82	74.4	72.0		2.4		25.6	11.0	14.6
ZOOLOGY	1447	475	76.6	68.4	6.3	1.9		23.4	12.6	10.7
OTHER BIOSCIENCES	1812	559	72.6	65.1	5.9	1.3	.4	27.4	13.1	14.3
OTHER CHEMISTRY FIELDS	950	362	59.1	13.8	40.1	4.7	.6	40.9	20.4	20.4
OTHER MEDICAL SCIENCES	573	351	68.4	51.3	16.2	.3	.6	31.6	13.1	18.5
BEHAVIORAL RELATED FIELDS	18532	6495	69.9	61.0	7.3	1.3	.3	30.1	19.1	11.0
ANTHROPOLOGY	1427	521	74.3	68.1	4.4	1.5	.2	25.7	18.8	6.9
CLINICAL PSYCHOLOGY	3524	654	65.9	63.0	1.7	.8	.5	34.1	23.7	10.4
ECONOMETRICS	104	87	47.1	11.5	35.6			52.9	31.0	21.8
OPERATIONS RESEARCH	385	214	61.2	5.6	52.8	2.3	.5	38.8	21.5	17.3
PSYCHOLOGY	8128	3383	72.5	68.2	2.8	1.3	.3	27.5	17.4	10.1
COUNSELING & GUIDANCE	902	360	67.8	63.1	2.8	1.4	.6	32.2	20.6	11.7
DEVELOPMENTAL/GERONTOL	686	410	75.1	72.9	1.2	.5	.5	24.9	15.6	9.3
EDUCATIONAL	565	294	67.0	59.5	5.4	1.7	.3	33.0	21.8	11.2
EXPERIMENTAL	1694	534	77.0	74.2	1.7	.9	.2	23.0	14.8	8.2
PHYSIOLOGICAL/COMPARATIVE	673	402	77.6	74.6	.7	1.7	.5	22.4	11.9	10.4
PSYCHOMETRICS	113	99	77.8	73.7	3.0	1.0		22.2	16.2	6.1
SCHOOL	453	290	66.2	56.9	9.0	.3		33.8	23.1	10.7
SOCIAL	918	455	77.1	72.7	1.5	2.9		22.9	15.2	7.7
OTHER PSYCHOLOGY	2124	539	67.2	63.1	2.8	.7	.6	32.8	19.9	13.0
SPEECH & HEARING SCIENCES	705	382	66.8	61.5	3.9	1.3		33.2	19.1	14.1
SOCIOLOGY	2781	600	70.2	61.0	7.3	1.5	.3	29.8	19.2	10.7
STATISTICS	910	376	66.5	43.4	20.5	2.4	.3	33.5	22.6	10.9
OTHER SOCIAL SCIENCES	568	278	60.4	36.7	23.4	.4		39.6	19.1	20.5

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[a] The sources for Appendixes C2-C5 are NRC, Survey of Earned Doctorates, Washington, D.C., 1971-75, and NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. C3 SURVEY RESPONSE BY SEX, YEAR OF DOCTORATE, AND SOURCE OF PREDOCTORAL SUPPORT

SEX/PHD YEAR & SUPPORT	POPULATION N	SAMPLE N	PERCENT RESPONDING TO SURVEY TOTAL	BIO/ BEH PHD	OTHER PHD FIELD	FRGN EMPL	DECEASED	PERCENT NOT RESPONDI TOTAL	NO RETRN	NOT REACHED
BIOMEDICAL REALTED FIELDS	19845	7784	71.6	58.0	11.4	1.9	.3	28.4	14.2	14.2
MALE	16181	6389	70.6	56.0	12.2	2.1	.2	29.4	14.7	14.7
FEMALE	3664	1395	76.5	67.2	7.7	1.1	.6	23.5	11.8	11.8
1971 PHD'S	4031	1400	65.4	52.9	10.4	1.4	.7	34.6	17.0	17.6
1972 PHD'S	3971	1410	69.3	55.5	11.1	2.3	.4	30.7	13.3	17.4
1973 PHD'S	3983	1425	69.4	5[illegible].4	10.4	1.5	.1	30.6	14.9	15.6
1974 PHD'S	3916	1468	72.1	58.4	11.2	2.2	.3	27.9	15.5	12.3
1975 PHD'S	3944	2081	78.5	63.4	13.1	1.9	.1	21.5	11.4	10.1
NIH PREDOCS	7182	3553	75.3	65.5	8.4	1.2	.3	24.7	12.6	12.0
OTHER PHD'S	12663	4231	68.5	51.8	14.0	2.4	.3	31.5	15.5	16.0
BEHAVIORAL RELATED FIELDS	18532	6495	69.9	61.0	7.3	1.3	.3	30.1	19.1	11.0
MALE	13565	4713	69.0	58.7	8.6	1.5	.3	31.0	19.8	11.1
FEMALE	4967	1782	72.1	67.1	3.8	.9	.3	27.9	17.1	10.8
1971 PHD'S	7334	2504	65.2	54.6	8.5	1.5	.6	34.8	19.4	15.4
1972 PHD'S	7443	2542	66.8	55.4	9.0	2.0	.5	33.2	18.1	15.1
1973 PHD'S	7714	2587	69.0	58.3	8.9	1.6	.2	31.0	17.7	13.3
1974 PHD'S	7870	2713	71.9	59.9	9.9	1.9	.2	28.1	16.2	11.9
1975 PHD'S	8016	3933	77.5	65.3	10.7	1.3	.2	22.5	12.7	9.8
NIH PREDOCS	12055	5891	74.6	66.9	6.4	1.1	.2	25.4	14.4	10.9
OTHER PHD'S	26322	8388	68.2	54.1	11.8	2.0	.4	31.8	17.8	14.0

APP. C4 SURVEY RESPONSE BY CITIZENSHIP, PLACE OF BIRTH, AND LOCATION OF BA INSTITUTION

	POPULATION	SAMPLE	PERCENT RESPONDING TO SURVEY					PERCENT NOT RES		
CITIZEN/BIRTH/BA LOCATION	N	N	TOTAL	BIO/ BEH PHD	OTHER PHD FIELD	FRGN EMPL	DECEASED	TOTAL	NO RETRN	NO REAC
BIOMEDICAL RELATED FIELDS	19845	7784	71.6	58.0	[illegible]	1.9	.3	28.4	14.2	14.
US CITIZEN	16847	6709	74.2	61.1	11.8	1.0	.3	25.8	13.7	12.
FOREIGN--PERMANENT US RESID	1408	507	58.4	45.8	9.1	3.4	.2	41.6	17.0	24.
FOREIGN--TEMPORARY US RESID	895	303	51.8	31.4	7.6	12.5	.3	48.2	21.8	26.
UNKNOWN CITIZENSHIP	695	265	53.6	33.2	9.4	9.4	1.5	46.4	12.5	34.
BORN IN US	16087	6393	74.7	61.5	11.9	1.0	.3	25.3	13.5	11.
FOREIGN BORN	3041	1121	58.4	43.1	9.4	5.6	.4	41.6	18.2	23.
UNKNOWN BIRTHPLACE	717	270	54.1	36.7	9.6	6.7	1.1	45.9	13.3	32.
US BA INSTITUTION	17315	6810	73.5	60.2	11.9	1.1	.3	26.5	13.7	12.
FOREIGN BA INSTITUTION	2143	774	56.2	38.9	8.7	8.1	.5	43.8	19.4	24.
UNKNOWN BA INSTITUTION	387	200	68.5	58.0	7.5	3.0		31.5	9.5	22.
BEHAVIORAL RELATED FIELDS	18532	6495	69.9	61.0	7.3	1.3	.3	30.1	19.1	11.
US CITIZEN	17091	6085	71.1	62.6	7.3	.9	.2	28.9	18.9	10.
FOREIGN--PERMANENT US RESID	551	167	54.5	40.7	7.2	6.0	.6	45.5	23.4	22.
FOREIGN--TEMPORARY US RESID	400	120	50.0	28.3	7.5	14.2		50.0	21.7	28.
UNKNOWN CITIZENSHIP	490	123	48.8	39.0	4.1	3.3	2.4	51.2	18.7	32.
BORN IN US	32508	12263	73.0	62.0	9.7	1.0	.3	27.0	16.0	10.
FOREIGN BORN	4635	1608	58.6	44.1	8.5	5.7	.3	41.4	19.3	22.
UNKNOWN BIRTHPLACE	1234	408	53.4	39.0	7.6	5.4	1.5	46.6	15.7	30.
US BA INSTITUTION	34765	12990	72.1	61.2	9.6	1.1	.3	27.9	16.2	11.
FOREIGN BA INSTITUTION	3062	1046	55.6	38.0	9.0	8.2	.5	44.4	20.5	23.
UNKNOWN BA INSTITUTION	550	243	66.7	56.0	6.6	3.7	.4	33.3	10.7	22.

APP. C5 SURVEY RESPONSE BY EMPLOYMENT STATUS AND INTENDED EMPLOYMENT AT COMPLETION OF DOCTORAL PROGRAM

	POPUL ATION	SAMPLE	PERCENT RESPONDING TO SURVEY					PERCENT NOT RESPONDING		
	N	N	TOTAL	BIO/ BEH PHD	OTHER PHD FIELD	FRGN EMPL	DEC EASED	TOTAL	NO RETRN	NOT REACHED
BIOMEDICAL RELATED FIELDS	19845	7784	71.6	58.0	11.4	1.9	.3	28.4	14.2	14.2
DEFINITE COMMITMENT	14386	5704	73.7	60.3	11.8	1.4	.2	26.3	13.7	12.6
NEGOTIATING CONTRACT	1712	723	68.9	57.5	8.7	2.1	.6	31.1	14.8	16.3
SEEKING POSITION	2263	810	68.8	55.8	10.9	2.0	.1	31.2	17.2	14.1
OTHER STATUS	87	30	83.3	73.3	10.0			16.7	6.7	10.0
UNKNOWN STATUS	1397	517	55.9	36.6	11.6	6.6	1.2	44.1	14.5	29.6
POSTDOCTORAL APPOINTMENT	8782	3359	74.0	62.8	8.9	2.1	.1	26.0	13.1	13.0
POSITION IN ACADEME	3913	1697	74.3	62.3	10.7	.8	.5	25.7	14.7	11.0
POSITION IN BUSINESS	1641	579	67.5	40.4	26.8	.2	.2	32.5	14.2	18.3
POSITION IN GOVERNMENT	1088	493	72.4	58.4	12.4	1.6		27.6	14.6	13.0
OTHER EMPLOYMENT PLANS	674	299	70.6	54.8	14.4	1.0	.3	29.4	14.4	15.1
EMPLOYMENT PLANS UNCERTAIN	3747	1357	64.2	48.9	11.1	3.7	.5	35.8	15.9	19.9
REMAIN IN PHD SPECIALTY AREA	9381	3606	73.1	59.9	11.5	1.5	.2	26.9	13.7	13.2
SWITCH TO OTHER FIELD	4793	1959	74.3	60.8	11.6	1.6	.3	25.7	13.6	12.1
FIELD OF EMPLOYMENT UNKNOWN	1924	862	71.1	58.1	11.4	1.4	.2	28.9	14.7	14.2
EMPLOYMENT PLANS UNCERTAIN	3747	1357	64.2	48.9	11.1	3.7	.5	35.8	15.9	19.9
BEHAVIORAL RELATED FIELDS	18532	6495	69.9	61.0	7.3	1.3	.3	30.1	19.1	11.0
DEFINITE COMMITMENT	13541	4830	71.3	62.5	7.6	1.1	.2	28.7	18.7	9.9
NEGOTIATING CONTRACT	1664	574	68.1	57.5	9.4	.9	.3	31.9	19.7	12.2
SEEKING POSITION	2130	786	69.7	61.5	5.5	2.2	.6	30.3	17.6	12.7
OTHER STATUS	98	30	56.7	56.7				43.3	33.3	10.0
UNKNOWN STATUS	1099	275	49.5	41.5	4.0	2.9	1.1	50.5	26.9	23.6
POSTDOCTORAL APPOINTMENT	1595	641	71.9	66.1	3.1	2.3	.3	28.1	16.8	11.2
POSITION IN ACADEME	8667	3118	71.4	62.5	7.6	1.1	.2	28.6	19.5	9.1
POSITION IN BUSINESS	590	228	67.1	44.3	22.4		.4	32.9	16.7	16.2
POSITION IN GOVERNMENT	2201	678	72.3	63.9	6.9	1.0	.4	27.7	17.1	10.6
OTHER EMPLOYMENT PLANS	2152	739	68.6	59.5	8.7	.4		31.4	20.2	11.2
EMPLOYMENT PLANS UNCERTAIN	3327	1091	64.3	56.3	4.9	2.3	.7	35.7	20.3	15.4
REMAIN IN PHD SPECIALTY AREA	9141	3071	72.2	64.1	6.9	1.0	.2	27.8	18.3	9.5
SWITCH TO OTHER FIELD	3598	1441	70.0	59.1	9.3	1.3	.2	30.0	19.0	11.0
FIELD OF EMPLOYMENT UNKNOWN	2466	892	68.5	59.0	8.1	1.1	.3	31.5	20.4	11.1
EMPLOYMENT PLANS UNCERTAIN	3327	1091	64.3	56.3	4.9	2.3	.7	35.7	20.3	15.4

APPENDIX D

DATA RELATING TO THE ANALYSIS OF ACADEMIC DEMAND FOR BIOMEDICAL PH.D.'S

APP. D1 Biomedical Science Baccalaureate Degrees and Undergraduate Enrollment

Fiscal Year	B.A. Degrees (excluding first professional)					Total Undergraduate Degree Credit Enrollment (thousands)	
	Total B.A.'s[a]	Total Biomed. Sci. & Health Prof.	Biomed. Sci.[b]	Health Professions[b]	Ratio of Biomed. Sci. and Health Prof. Relative to Total B.A.'s	Incl. First Professional[c]	Excl. First Professional[d]
1960						3,402	3,334
1961	368,857	27,066	15,588	11,478	0.0734	3,610	3,538
1962	387,830	27,822	16,424	11,398	0.0717	3,891	3,813
1963	416,421	30,587	18,704	11,883	0.0735	4,207	4,123
1964	466,486	33,797	22,207	11,590	0.0725	4,529	4,438
1965	501,248	36,276	24,612	11,664	0.0724	4,342	4,255
1966	520,248	41,390	26,336	15,054	0.0796	4,829	4,732
1967	558,075	44,198	28,157	16,041	0.0792	5,160	5,057
1968	631,923	48,792	31,221	17,571	0.0772	5,557	5,437
1969	728,167	54,820	34,816	20,004	0.0753	6,043	5,905
1970	791,510	58,748	36,868	21,880	0.0742	6,529	6,377
1971	839,730	60,706	35,222	25,484	0.0723	6,889	6,719
1972	887,273	65,768	36,875	28,893	0.0741	7,104	6,913
1973	922,130	75,599	41,667	33,932	0.0820	7,199	6,998
1974	945,870	89,303	47,434	41,869	0.0944	7,397	7,189
1975	944,000	90,187	47,390	42,797	0.0955	7,833	7,610

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[a] From U.S. Office of Education (1973, 1975, 1976).

[b] Figures from 1960-74 were compiled from U.S. Office of Education (1948-73, 1960-73 annual reports). The figure for 1975 was estimated by CHR.

[c] Figures for 1960-64 were from U.S. Office of Education (1961-63). Figures for 1965-75 were from U.S. Office of Education (1976); those for 1965-68 were estimates.

[d] Estimated from 1960 to 1967 at 98 percent of previous column. Data after 1967 were obtained by subtracting first professional enrollment (U.S. Office of Education, 1959-75; fall 1967-75 reports) from previous column.

APP. D2 Determinants of Academic Employment for Biomedical Science Ph.D.'s.

	Enrollments							
Fiscal Year	Total Biomed. Sci. & Health Prof. Grad. & Undergrad. (S)	Estimated Biomed. Sci. Undergrad.[a]	Biomed. Sci. Graduate[b]	Health Prof. Graduate[c]	Medical & Dental Schools[d]	Estimated Biomed. Sci. Academically Employed Ph.D.'s[e] (excl. postdocs) (F)	Ratio of Biomed. Sci. Academically Employed Ph.D.'s Relative to Total Bio. Enrollment (F/S)	Life Science R and D in Colleges & Univ.[f] (thousands of 1967 $) (LSRD)
1960	297,921	239,048	10,717	4,491	43,665	7,975	0.0267	430,132
1961	321,960	260,043	12,207	5,042	43,868	8,436	0.0262	495,719
1962	340,697	276,442	13,465	6,199	44,571	8,896	0.0261	569,381
1963	365,069	298,505	14,881	6,586	45,067	9,946	0.0272	662,190
1964	423,753	353,264	17,475	7,322	45,692	10,998	0.0284	759,013
1965	411,881	336,996	20,347	8,234	46,304	11,762	0.0286	829,224
1966	444,435	365,310	23,361	8,909	46,855	12,527	0.0282	909,631
1967	462,321	380,792	24,347	9,338	47,844	14,109	0.0305	951,856
1968	490,554	403,425	27,497	10,139	49,493	15,692	0.0320	989,533
1969	518,316	426,932	28,770	11,372	51,241	17,181	0.0331	1,004,609
1970	569,620	472,536	30,843	12,564	53,677	18,670	0.0328	1,029,525
1971	654,843	550,958	32,603	14,242	57,040	20,679	0.0316	1,037,347
1972	767,646	652,587	33,508	20,596	60,555	22,708	0.0296	1,039,662
1973	792,631	668,309	34,088	23,692	65,742	24,469	0.0309	1,124,478
1974	825,789	692,301	36,111	27,292	70,085	27,236	0.0330	1,128,397
1975	879,040	736,648	38,314	30,370	73,700	28,852	0.0328	1,206,243

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[a] Estimated by the formula $U_i = (A_{i+2}/B_{i+2})C_i$, where U_i = bioscience undergraduate enrollment in year i, A_{i+2} = bioscience and health professions baccalaureate degrees awarded in year i + 2, B_{i+2} = total baccalaureate degrees awarded in year i + 2, C_i = total undergraduate degree credit enrollment in year i. First professionals were excluded in this computation. See Appendix D1 for supporting data.

[b] From U.S. Office of Education (1959-75) except the figure for 1966, which was estimated by CHR.

[c] From U.S. Office of Education (1959-75).

[d] Medical school enrollment figures for 1960-72 from the Association of American Medical Colleges (1973); figures after 1973 were supplied by Mr. J. Rosenthal, AAMC. Dental school enrollment figures from the American Association of Dental Schools.

[e] Figures in 1960-71 were estimated by CHR. Figures in 1972-75 were from NRC (1973, 1975d).

[f] From NSF (1976).

APP. D3 **National Expenditures for Health-related R and D (billions of dollars)**

	Actual Dollars[a]				Constant 1967 Dollars[b]			
Year	Total	Federal	Private Industry	Other	Total	Federal	Private Industry	Other
1952	0.197	0.103	0.052	0.042				
1953	0.214	0.107	0.058	0.049				
1954	0.237	0.119	0.061	0.057				
1955	0.261	0.139	0.062	0.060				
1956	0.312	0.162	0.079	0.071				
1957	0.440	0.229	0.126	0.085				
1958	0.543	0.279	0.170	0.094				
1959	0.648	0.351	0.190	0.107				
1960	0.900	0.448	0.253	0.199				
1961	1.096	0.574	0.312	0.200	1.328	0.695	0.378	0.242
1962	1.337	0.782	0.336	0.219	1.571	0.918	0.394	0.257
1963	1.526	0.919	0.375	0.232	1.744	1.050	0.428	0.265
1964	1.690	1.049	0.400	0.241	1.882	1.168	0.445	0.268
1965	1.884	1.174	0.450	0.260	2.032	1.266	0.485	0.280
1966	2.104	1.316	0.510	0.278	2.194	1.372	0.531	0.290
1967	2.338	1.459	0.580	0.299	2.338	1.458	0.580	0.299
1968	2.553	1.581	0.661	0.310	2.436	1.509	0.630	0.296
1969	2.762	1.674	0.754	0.334	2.511	1.521	0.685	0.304
1970	2.805	1.667	0.795	0.343	2.418	1.437	0.685	0.296
1971	3.107	1.877	0.860	0.370	2.536	1.532	0.702	0.302
1972	3.454	2.147	0.925	0.382	2.655	1.650	0.711	0.294
1973	3.667	2.225	1.033	0.409	2.696	1.636	0.759	0.301
1974	4.390	2.754	1.187	0.449	3.046	1.911	0.819	0.312
1975	4.610	2.799	1.322	0.489	2.934	1.782	0.842	0.311
1976[c]	5.029	3.084	1.436	0.509	2.922	1.792	0.834	0.296

[a] Unpublished data from the Office of Resource Analysis, NIH.

[b] Computed by using the price index developed by NSF (1972) for deflating academic R and D. See Appendix G2.

[c] Estimated.

APP. D4 Research and Development Expenditures in Higher Education and Selected Fields for Selected Fiscal Years (millions of dollars)

Fiscal Year	Total Res. and Dev. in Higher Education[a]		HEW Res. and Dev. in Psych. and Soc. Sci.[b]		NIH Research Grants and Contracts Expenditures[c]
	Current $	1967 $	Current $	1967 $	1967 $
1936	22	53.0			
1937	24	55.8			
1938	25	59.2			
1939	26	62.5			
1940	27	64.3			
1941	30	68.1			
1942	34	69.7			
1943	46	88.8			
1944	58	110.1			
1945	72	133.6			
1946	87	148.7			
1947	123	183.9			
1948	159	220.5			
1949	192	268.9			
1950	225	312.1			
1951	272	349.6			
1952	318	400.0			
1953	376	469.4			
1954	431	535.4			
1955	492	613.5			
1956	566	695.3			
1957	650	771.1			
1958	749	864.9			
1959	864	989.7	13	16.8	
1960	1006	1134.2	17	21.3	
1961	1173	1309.2	42	50.9	
1962	1374	1516.6	54	63.5	
1963	1611	1756.8	67	76.6	
1964	1904	2049.5	89	99.1	
1965	2103	2225.4	115	124.1	
1966	2345	2412.6	131	136.6	495.0
1967	2594	2594.0	140	140.0	538.9
1968	2868	2752.4	127	121.2	534.1
1969	2945	2682.1	151	137.3	508.8
1970	3072	2641.4	145	125.0	465.9
1971	3216	26[illegible]1.3	185	151.0	504.7
1972	3439	27[illegible]4.6	184	141.4	571.5
1973	3751	2818.2	160	177.6	578.7
1974	3873	2622.2	189	131.2	687.5
1975	4010	2487.6	166	105.7	683.0

[a] Data before 1953 were from U.S. Bureau of the Census (1975c). Odd years were obtained by interpolation. Data from 1953 from NSF (1975b). These include Federally Funded Research and Development Centers administered by individual universities and colleges and by university-consortia. Figures for 1974 and 1975 were NSF estimates. Consumer price index (U.S. Bureau of the Census, 1974b and 1975c) was used to obtain 1967 $ amounts.

[b] From NSF (1960-76). Figures for 1960 and 1962 were NSF estimates. R and D price index (NSF, 1972) was used to obtain 1967 $ amounts. R and D price index for 1959 and 1960 were estimated at 77.5 and 80.0, respectively, by CHR.

[c] Basic data from NIH (1966-75). Figures do not include general research support programs. R and D price index was used to obtain 1967 $ amounts.

APPENDIX E

FINDINGS FROM THE SURVEY OF BEHAVIORAL SCIENTISTS

APP. E1.1 EMPLOYMENT STATUS SINCE EARNING DOCTORATE[a]

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S		PERCENT OF TIME IN				
	SURVEY RESP	EST TOTAL	POST DOC	F-T EMPL	P-T EMPL	SEEK EMPL	OTHER STATUS
TOTAL BEHAVIORAL SCIENCES	3844	15926	6.5	83.5	5.9	2.0	2.1
ANTHROPOLOGY	352	1350	4.6	82.4	6.0	3.7	3.3
BIOLOGICAL & MEDICAL	56	209	4.6	87.1	5.2	1.3	1.8
CULTURAL & SOCIAL	260	992	5.1	80.2	6.5	4.2	4.1
OTHER	36	149	1.4	90.7	3.7	3.7	0.5
CLINICAL PSYCHOLOGY	645	4237	3.9	84.6	8.6	1.2	1.8
PSYCHOLOGY	2163	7218	9.2	81.1	5.2	2.1	2.4
COGNITIVE	115	433	12.3	74.0	8.4	2.5	2.9
COUNSELING & GUIDANCE	166	628	2.4	86.4	7.2	1.8	2.3
HUMAN DEVEL & GERONTOL	410	1210	6.6	84.4	4.7	2.2	2.2
HUMAN LEARNING & PERFORM	140	551	4.4	85.3	5.8	2.3	2.2
NEUROBEHAVIORAL SCIENCES	115	316	24.2	63.3	5.6	2.4	4.4
PERCEPTUAL & SENSORY	74	264	12.3	78.7	5.1	1.2	2.6
PERSONALITY & EXPERMNTL	49	242	11.7	79.7	1.7	3.8	3.1
PHYSIOL & COMPARATIVE	245	624	30.6	58.7	6.1	2.3	2.2
PSYCHOLINGUISTICS	41	125	10.0	72.2	8.2	7.0	2.7
PSYCHOPHYSICS & -METRICS	79	178	5.0	83.4	9.4	0.9	1.2
SOCIAL	418	1435	3.4	87.2	4.0	2.4	3.1
OTHER	311	1212	8.2	85.6	3.9	0.9	1.3
SOCIOLOGY	363	2155	4.5	88.2	4.0	2.4	0.8
COMPLEX ORGANIZ & PROF	72	475	4.3	90.2	4.1	0.4	1.0
CRIMINOLOGY&DEVIANT BEH	52	266	2.8	84.4	3.5	8.6	0.7
DEMOGRAPHY	39	201	3.1	91.6	4.5	0.4	0.3
MEDICAL	62	267	4.4	88.3	5.1	0.6	1.6
OTHER	138	946	5.3	87.6	3.7	2.6	0.7
OTHER BEHAVIORAL SCIENCES	321	966	5.1	86.8	3.5	1.6	3.0
COMMUNICATIONS SCIENCES	140	412	4.1	89.8	3.5	1.1	1.4
ETHOLOGY & SOCIOBIOLOGY	43	160	7.8	77.2	6.2	4.2	4.6
OTHER	138	394	4.9	87.3	2.5	1.2	4.1
FY 1971 PHD'S	593	2817	6.2	83.7	6.7	1.1	2.2
FY 1972 PHD'S	600	2920	5.0	88.1	3.0	1.9	2.0
FY 1973 PHD'S	674	3059	5.8	85.0	5.7	1.7	1.8
FY 1974 PHD'S	752	3523	6.1	82.2	8.1	1.6	1.9
FY 1975 PHD'S	1225	3607	9.0	79.4	5.4	3.4	2.8
NIH/ADAMHA/HRA PREDOCS	1389	4698	8.1	81.7	6.7	1.7	1.9
OTHER BEHAVIORAL PHD'S	2455	11228	5.9	84.2	5.6	2.2	2.2
MALE	2648	11284	6.1	88.2	2.8	1.4	1.4
FEMALE	1196	4642	7.5	71.8	13.4	3.4	3.9

[a] The source for Appendixes E1-E18 is NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. E1.2 EMPLOYMENT STATUS OF TRAINEES/FELLOWS[a] SINCE EARNING DOCTORATE

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S SURVEY RESP	 EST TOTAL	PERCENT OF TIME IN POST DOC	 F-T EMPL	 P-T EMPL	 SEEK EMPL	 OTHER STATUS
TOTAL BEHAVIORAL SCIENCES	1389	4698	8.1	81.7	6.7	1.7	1.9
ANTHROPOLOGY	140	408	8.8	79.7	4.7	4.0	2.9
BIOLOGICAL & MEDICAL	20	58	5.3	92.3	0.0	1.2	1.2
CULTURAL & SOCIAL	116	340	9.7	77.3	5.4	4.6	3.1
OTHER	4	10	0.0	84.9	8.0	2.0	5.1
CLINICAL PSYCHOLOGY	244	1583	3.6	83.3	10.7	1.0	1.4
PSYCHOLOGY	779	1958	13.0	77.7	5.2	1.7	2.4
COGNITIVE	44	129	10.1	75.7	9.4	1.9	2.9
COUNSELING & GUIDANCE	11	35	2.8	85.9	6.0	3.4	2.1
HUMAN DEVEL & GERONTCL	158	359	8.9	80.9	6.5	2.1	1.6
HUMAN LEARNING & PERFORM	45	131	4.3	90.3	4.4	0.2	0.9
NEUROBEHAVIORAL SCIENCES	61	155	26.9	60.3	6.7	1.0	5.0
PERCEPTUAL & SENSORY	29	79	14.6	76.4	3.5	2.0	3.5
PERSONALITY & EXPERMNTL	18	46	11.4	66.9	9.0	5.9	6.8
PHYSIOL & COMPARATIVE	111	246	35.1	57.2	4.5	1.9	1.3
PSYCHOLINGUISTICS	21	59	10.1	75.6	7.0	4.6	2.8
PSYCHOPHYSICS & -METRICS	19	33	0.4	98.8	0.0	0.8	0.0
SOCIAL	169	640	4.1	89.0	2.4	1.7	2.9
OTHER	93	245	14.0	77.6	6.4	0.4	1.6
SOCIOLOGY	144	550	2.4	92.5	3.1	1.1	0.9
COMPLEX ORGANIZ & PROF	24	98	1.9	89.3	7.1	1.5	0.3
CRIMINOLOGY&DEVIANT BEH	15	48	2.8	91.6	0.6	5.0	0.0
DEMOGRAPHY	22	86	4.7	91.7	2.6	1.0	0.0
MEDICAL	36	135	2.0	95.4	1.0	0.3	1.3
OTHER	47	183	1.9	92.7	3.4	0.6	1.4
OTHER BEHAVIORAL SCIENCES	82	199	9.5	82.1	2.5	3.0	2.9
COMMUNICATIONS SCIENCES	34	77	5.5	92.6	1.0	0.4	0.5
ETHOLOGY & SOCIOBIOLOGY	13	31	19.1	54.7	9.3	11.8	5.1
OTHER	35	91	9.6	82.5	1.5	2.3	4.2
FY 1971 PHD'S	240	890	6.9	81.0	8.7	1.4	2.0
FY 1972 PHD'S	244	906	6.4	87.1	3.1	1.4	2.0
FY 1973 PHD'S	245	912	6.4	82.6	5.9	1.5	1.6
FY 1974 PHD'S	246	944	7.9	78.7	9.9	1.7	1.8
FY 1975 PHD'S	414	1046	10.5	79.5	5.8	2.2	2.2
NIH/ADAMHA/HRA PREDOCS	1389	4698	8.1	81.7	6.7	1.7	1.9
MALE	916	3177	7.7	87.0	2.5	1.2	1.6
FEMALE	473	1521	9.0	70.5	15.4	2.6	2.6

[a] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA.

APP. E2.1 CURRENT (OCTOBER 1976) EMPLOYMENT STATUS

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S SURVEY RESP	ALL PHD'S EST TOTAL	PERCENT CURRENTLY IN POST DOC	F-T EMPL	P-T EMPL	SEEK EMPL	OTHER STATUS
TOTAL BEHAVIORAL SCIENCES	3892	15926	2.9	88.2	5.4	2.4	1.1
ANTHROPOLOGY	359	1350	1.9	85.4	5.6	5.3	1.7
BIOLOGICAL & MEDICAL	57	209	1.4	85.6	2.9	8.6	1.4
CULTURAL & SOCIAL	265	992	2.3	84.1	6.5	5.1	2.0
OTHER	37	149		94.0	4.0	2.0	
CLINICAL PSYCHOLOGY	654	4237	1.3	87.2	8.7	2.0	.8
PSYCHOLOGY	2189	7218	4.6	87.6	4.2	2.1	1.5
COGNITIVE	116	433	5.3	84.3	7.9	1.2	1.4
COUNSELING & GUIDANCE	170	628		92.2	5.7	.8	1.3
HUMAN DEVEL & GERONTOL	415	1210	3.9	87.2	5.2	3.1	.7
HUMAN LEARNING & PERFORM	140	551	2.9	88.6	3.1	3.8	1.6
NEUROBEHAVIORAL SCIENCES	116	316	13.9	74.1	5.1	3.8	3.2
PERCEPTUAL & SENSORY	74	264	4.5	84.5	4.2	1.1	5.7
PERSONALITY & EXPERMNTL	50	242		90.5	2.9	3.7	2.9
PHYSIOL & COMPARATIVE	251	624	16.0	73.1	4.8	3.7	2.4
PSYCHOLINGUISTICS	41	125	5.6	80.0	7.2	5.6	1.6
PSYCHOPHYSICS & -METRICS	80	178	4.5	93.3		2.2	
SOCIAL	423	1435	1.5	92.2	3.0	1.4	1.9
OTHER	313	1212	4.3	92.0	3.1	.3	.3
SOCIOLOGY	366	2155	.9	93.0	3.2	2.7	.1
COMPLEX ORGANIZ & PROF	72	475		93.7	4.8	.8	.6
CRIMINOLOGY&DEVIANT BEH	53	266	1.5	89.5	1.1	7.9	
DEMOGRAPHY	40	201	6.5	80.6	7.5	5.5	
MEDICAL	63	267		98.1	1.9		
OTHER	138	946	.3	94.9	2.4	2.3	
OTHER BEHAVIORAL SCIENCES	324	966	2.2	90.4	4.5	1.9	1.1
COMMUNICATIONS SCIENCES	141	412	1.0	93.2	4.9	1.0	
ETHOLOGY & SOCIOBIOLOGY	44	160	4.4	87.5	6.9	1.3	
OTHER	139	394	2.5	68.6	3.0	3.0	2.8
FY 1971 PHD'S	606	2817	1.4	87.6	7.8	1.9	1.3
FY 1972 PHD'S	608	2920	.9	92.0	4.6	1.4	1.2
FY 1973 PHD'S	679	3059	1.6	89.7	5.2	2.8	.8
FY 1974 PHD'S	762	3523	3.2	87.6	5.9	2.3	1.1
FY 1975 PHD'S	1237	3607	6.3	85.0	3.9	3.4	1.4
NIH/ADAMHA/HRA PREDOCS	1404	4658	4.1	86.5	6.5	1.9	1.0
OTHER BEHAVIORAL PHD'S	2488	11228	2.3	88.9	4.9	2.6	1.2
MALE	2679	11284	2.5	92.6	2.4	1.8	.7
FEMALE	1213	4642	3.7	77.6	12.6	3.9	2.3

APP. E2.2 CURRENT (OCTOBER 1976) EMPLOYMENT STATUS OF TRAINEES/FELLOWS[a]

	ALL PHD'S		PERCENT CURRENTLY IN				
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	POST DOC	F-T EMPL	P-T EMPL	SEEK EMPL	OTHER STATUS
TOTAL BEHAVIORAL SCIENCES	1404	4698	4.1	86.5	6.5	1.9	1.0
ANTHROPOLOGY	141	408	3.9	85.8	4.7	3.2	2.5
BIOLOGICAL & MEDICAL	20	58		94.8			5.2
CULTURAL & SOCIAL	117	340	4.7	83.8	5.6	3.8	2.1
OTHER	4	10		100.0			
CLINICAL PSYCHOLOGY	247	1583	1.9	85.7	10.2	1.7	.5
PSYCHOLOGY	788	1958	6.8	84.8	5.5	1.7	1.2
COGNITIVE	44	129	4.7	85.3	8.5	1.6	
COUNSELING & GUIDANCE	13	35		85.7	11.4	2.9	
HUMAN DEVEL & GERONTOL	160	359	3.1	84.4	7.8	3.3	1.4
HUMAN LEARNING & PERFORM	45	131	3.8	90.8	3.8	1.5	
NEUROBEHAVIORAL SCIENCES	62	156	11.5	76.9	5.1	2.6	3.8
PERCEPTUAL & SENSORY	29	79	11.4	79.7	5.1		3.8
PERSONALITY & EXPERMNTL	19	46		76.1	15.2	8.7	
PHYSIOL & COMPARATIVE	112	246	19.1	75.6	4.1		1.2
PSYCHOLINGUISTICS	21	59	6.8	91.5	1.7		
PSYCHOPHYSICS & -METRICS	20	33		100.0			
SOCIAL	170	440	3.0	90.9	3.2	1.4	1.6
OTHER	93	245	8.2	84.9	6.1	.8	
SOCIOLOGY	145	550	1.3	93.8	3.6	.7	.5
COMPLEX ORGANIZ & PROF	24	98		83.7	9.2	4.1	3.1
CRIMINOLOGY&DEVIANT BEH	15	48	8.3	91.7			
DEMOGRAPHY	22	86	3.5	91.9	4.7		
MEDICAL	37	135		96.3	3.7		
OTHER	47	183		98.9	1.1		
OTHER BEHAVIORAL SCIENCES	83	199	4.0	90.5		5.5	
COMMUNICATIONS SCIENCES	34	77	2.6	94.8		2.6	
ETHOLOGY & SOCIOBIOLOGY	13	31		100.0			
OTHER	36	91	6.6	83.5		9.9	
FY 1971 PHD'S	246	890	2.6	83.8	9.4	2.2	1.9
FY 1972 PHD'S	245	906	.9	91.9	5.8	.7	.7
FY 1973 PHD'S	246	912	4.4	85.0	7.1	2.5	1.0
FY 1974 PHD'S	248	944	4.4	86.8	7.0	1.1	.7
FY 1975 PHD'S	419	1046	7.7	85.2	3.7	2.8	.6
NIH/ADAMHA/HRA PREDOCS	1404	4698	4.1	86.5	6.5	1.9	1.0
MALE	925	3177	3.7	91.3	3.0	1.5	.6
FEMALE	479	1521	5.1	76.5	13.9	2.7	1.8

[a] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA.

APP. E3.1 SECTOR OF EMPLOYMENT

PHD FIELD/YEAR/SUPPORT/SEX	ALL EMPLOYED		PERCENT EMPLOYED OR ON POSTDOCTORAL APPOINTMENTS IN													
			EDUCATIONAL INSTITUTION					***GOVERNMENT***			****BUSINESS****			**OTHER SECTORS**		
	SURVEY RESP	EST TOTAL	TOTAL	UNIV/ COLL	MED SCHL	PROF SCHL	OTHER EDUC	TOTAL	FEDL GOVT	OTHER GOVT	TOTAL	SELF EMPL	OTHER BUSN	TOTAL	HOSP/ CLNIC	OTHER TYPE
TOTAL BEHAVIORAL SCIENCES	3716	15362	64.4	49.1	7.4	1.8	6.1	12.5	6.4	6.2	9.5	6.9	2.6	13.5	7.3	6.2
ANTHROPOLOGY	326	1255	88.1	76.9	4.2	1.7	5.3	4.8	2.4	2.4	2.5	1.8	.7	4.6	1.4	3.2
BIOLOGICAL & MEDICAL	51	188	93.1	66.0	18.6	4.3	4.3	2.1		2.1				4.8	3.2	1.6
CULTURAL & SOCIAL	239	921	90.3	82.4	1.9	1.0	5.0	2.7	1.8	.9	2.7	1.7	1.0	4.3	.6	3.8
OTHER	36	146	67.8	56.8		2.7	8.2	21.2	8.9	12.3	4.8	4.8		6.2	4.1	2.1
CLINICAL PSYCHOLOGY	624	4119	33.0	17.4	10.7	.6	4.3	21.8	9.5	12.4	17.2	16.5	.7	27.9	18.7	9.3
PSYCHOLOGY	2097	6957	72.7	55.2	7.1	2.0	8.4	10.6	5.8	4.8	7.6	3.6	4.0	9.1	3.8	5.3
COGNITIVE	113	422	70.6	58.3	5.7	1.4	5.2	7.8	4.7	3.1	11.6	3.3	8.3	10.0	5.9	4.0
COUNSELING & GUIDANCE	164	615	56.3	38.4	4.7	2.0	11.2	18.0	10.2	7.8	12.9	11.9	1.0	12.9	6.8	6.0
HUMAN DEVEL & GERONTCL	398	1165	77.0	59.6	5.5	3.9	8.1	6.8	1.6	5.2	4.2	3.5	.7	12.0	5.2	6.8
HUMAN LEARNING & PERFORM	134	521	69.9	42.8	4.2	1.0	21.9	16.5	9.6	6.9	6.3	2.9	3.5	7.3	3.8	3.5
NEUROBEHAVIORAL SCIENCES	105	294	71.1	29.6	34.7	6.2	.7	11.7	5.8	5.8	3.1	2.1	1.0	14.1	5.5	8.6
PERCEPTUAL & SENSORY	65	246	86.6	65.0	6.1	4.5	11.0	4.1	4.1		8.5	1.2	7.3	.8		.8
PERSONALITY & EXPERMNTL	46	226	72.1	56.6	9.7	1.8	4.0	15.9	4.9	11.1	1.3		1.3	10.6	5.8	4.9
PHYSIOL & COMPARATIVE	236	586	76.5	53.8	15.7	2.4	4.6	12.6	8.7	3.9	6.3	4.9	1.4	4.6	2.7	1.9
PSYCHOLINGUISTICS	38	116	89.7	77.6	3.4		8.6	5.2	2.6	2.6	4.3	1.7	2.6	.9	.9	
PSYCHOPHYSICS & -METRICS	78	174	71.3	60.9	6.9	1.1	2.3	10.3	8.0	2.3	8.6	1.1	7.5	9.8		9.8
SOCIAL	408	1388	75.1	67.8	3.3	1.3	2.7	8.9	5.2	3.7	8.3	3.4	4.9	7.7	2.6	5.1
OTHER	308	1204	70.2	50.6	4.9	.5	14.2	10.5	5.9	4.5	9.4	1.8	7.7	9.9	3.0	6.9
SOCIOLOGY	355	2054	79.5	69.9	3.5	3.3	2.9	6.9	4.2	2.8	6.3	3.0	3.3	7.3	1.3	6.0
COMPLEX ORGANIZ & PROF	70	468	67.5	62.0	.9	4.1	.6	1.9	.6	1.3	17.9	7.3	10.7	12.6	3.6	9.0
CRIMINOLOGY&DEVIANT BEH	51	245	90.6	80.8		3.3	6.5	5.3	2.9	2.4	1.6		1.6	2.4		2.4
DEMOGRAPHY	38	190	65.6	52.2		3.9	9.4	24.4	22.2	2.2	5.0	1.7	3.3	5.0		5.0
MEDICAL	63	267	81.6	49.8	17.2	12.7	1.9	10.9	7.9	3.0	.7	.7		6.7	.7	6.0
OTHER	133	924	84.8	80.4	2.4		2.0	5.3	1.7	3.6	3.4	2.4	1.0	6.5	.8	5.7
OTHER BEHAVIORAL SCIENCES	314	937	75.8	60.6	8.1	1.9	5.1	9.2	7.5	1.7	6.5	4.5	2.0	8.5	4.8	3.7
COMMUNICATIONS SCIENCES	139	408	75.7	59.1	7.1	2.0	7.6	9.6	7.1	2.5	6.1	4.7	1.5	8.6	6.9	1.7
ETHOLOGY & SOCIOBIOLOGY	43	158	76.6	71.5	1.3		3.8	8.9	8.9		11.4	6.3	5.1	3.2		3.2
OTHER	132	371	75.5	57.7	12.1	2.7	3.0	8.9	7.3	1.6	4.9	3.5	1.3	10.8	4.6	6.2
FY 1971 PHD'S	581	2727	68.6	55.7	6.6	1.8	4.5	11.5	5.4	6.1	11.6	9.6	2.0	8.3	4.5	3.8
FY 1972 PHD'S	588	2845	70.3	52.6	8.4	1.5	7.8	11.6	6.3	5.3	8.2	6.8	1.3	9.9	5.4	4.5
FY 1973 PHD'S	650	2950	58.3	44.8	6.2	2.2	5.1	12.5	6.8	5.7	12.2	8.8	3.4	17.0	8.5	8.5
FY 1974 PHD'S	727	3406	61.3	44.8	7.4	2.0	7.0	14.0	7.0	6.9	9.2	6.2	2.9	15.6	8.7	6.9
FY 1975 PHD'S	1170	3434	64.5	48.9	8.1	1.5	5.9	12.8	6.2	6.6	7.1	3.8	3.3	15.6	8.7	6.9
NIH/ADAMHA/HRA PREDOCS	1352	4565	67.0	49.8	10.9	2.6	3.7	13.4	6.6	6.9	6.1	4.9	1.2	13.5	7.6	5.9
OTHER BEHAVIORAL PHD'S	2364	10797	63.3	48.8	5.9	1.5	7.1	12.2	6.3	5.9	11.0	7.8	3.2	13.5	7.2	6.3
MALE	2587	11005	63.1	49.3	7.1	1.0	5.8	13.8	7.6	6.2	9.7	6.5	3.2	13.4	7.6	5.8
FEMALE	1129	4357	67.6	48.8	8.0	3.8	7.0	9.4	3.2	6.1	9.2	8.0	1.2	13.8	6.6	7.2

APP. E3.2 SECTOR OF EMPLOYMENT OF TRAINEES/FELLOWS[*]

	ALL EMPLOYED		PERCENT EMPLOYED OR ON POSTDOCTORAL APPOINTMENTS IN													
			EDUCATIONAL INSTITUTION					***GOVERNMENT***			****BUSINESS****			**OTHER SECTORS**		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	TOTAL	UNIV/ COLL	MED SCHL	PROF SCHL	OTHER EDUC	TOTAL	FEDL GOVT	OTHER GOVT	TOTAL	SELF EMPL	OTHER BUSN	TOTAL	HOSP/ CLNIC	OTHER TYPE
TOTAL BEHAVIORAL SCIENCES	1352	4565	67.0	49.8	10.9	2.6	3.7	13.4	6.6	6.9	6.1	4.9	1.2	13.5	7.6	5.9
ANTHROPOLOGY	131	385	88.1	74.9	6.9	2.1	4.2	2.6	1.6	1.1	4.5	4.0	.5	4.8	2.1	2.6
BIOLOGICAL & MEDICAL	19	55	89.1	63.6	16.4	5.5	3.6							10.9	10.9	
CULTURAL & SOCIAL	108	320	88.2	77.6	5.4	1.6	3.5	2.6	1.9	.6	5.4	4.8	.6	3.8	.6	3.2
OTHER	4	10	80.0	50.0			30.0	20.0		20.0						
CLINICAL PSYCHOLOGY	237	1548	40.0	21.9	14.8	.8	2.5	25.6	10.7	14.9	9.1	8.4	.7	25.3	16.1	9.1
PSYCHOLOGY	761	1901	79.9	61.5	9.8	3.2	5.4	7.0	4.0	3.0	4.9	3.2	1.6	8.3	3.6	4.7
COGNITIVE	43	127	83.5	70.9	10.2		2.4	7.9	5.5	2.4	3.1	3.1		5.5	1.6	3.9
COUNSELING & GUIDANCE	12	34	64.7	29.4		29.4	5.9	23.5	23.5		11.8	11.8				
HUMAN DEVEL & GERONTOL	153	342	79.8	61.7	7.9	5.8	4.4	7.9	.9	7.0	2.0	2.0		10.2	7.9	2.3
HUMAN LEARNING & PERFORM	44	129	86.8	61.2	5.4	.8	19.4	8.5	7.0	1.6	2.3		2.3	2.3		2.3
NEUROBEHAVIORAL SCIENCES	57	146	70.6	38.5	26.6	4.9	.7	4.2	1.4	2.8	4.2	4.2		21.0	11.2	9.8
PERCEPTUAL & SENSORY	28	76	89.5	65.8	9.2	3.9	10.5	2.6	2.6		7.9	3.9	3.9			
PERSONALITY & EXPERMNTL	17	42	78.6	66.7	11.9			7.1	4.8	2.4	7.1		7.1	7.1	7.1	
PHYSIOL & COMPARATIVE	111	243	81.9	52.7	23.5	1.2	4.5	7.0	5.3	1.6	6.2	4.5	1.6	4.9	1.2	3.7
PSYCHOLINGUISTICS	21	59	89.8	69.5	6.8		13.6	5.1	5.1		3.4	3.4		1.7	1.7	
PSYCHOPHYSICS & -METRICS	20	33	48.5	36.4	6.1	6.1		12.1	3.0	9.1	24.2		24.2	15.2		15.2
SOCIAL	163	427	78.8	71.2	5.0	2.4	.2	6.3	4.3	1.9	7.0	4.6	2.4	7.9	3.4	4.6
OTHER	92	243	80.7	65.8	1.6	1.6	11.5	6.2	2.9	3.3	2.1	2.1		11.1	.8	10.3
SOCIOLOGY	143	543	78.6	65.7	6.3	5.5	1.1	10.7	7.7	2.9	4.4	2.8	1.7	6.3	1.7	4.6
COMPLEX ORGANIZ & PROF	22	91	78.0	69.2	4.4	4.4		6.6		6.6	12.1	9.9	2.2	3.3		3.3
CRIMINOLOGY&DEVIANT BEH	15	48	85.4	68.8		16.7		4.2		4.2	8.3		8.3	2.1		2.1
DEMOGRAPHY	22	86	57.0	46.5		3.5	7.0	37.2	32.6	4.7				5.8		5.8
MEDICAL	37	135	81.5	48.1	22.2	11.1		10.4	7.4	3.0	1.5	1.5		6.7	1.5	5.2
OTHER	47	183	85.2	85.2				2.2	2.2		3.8	2.2	1.6	8.7	3.8	4.9
OTHER BEHAVIORAL SCIENCES	80	188	83.5	66.0	11.7	3.7	2.1	7.4	5.3	2.1	1.1		1.1	8.0	5.3	2.7
COMMUNICATIONS SCIENCES	33	75	82.7	73.3	6.7		2.7	8.0	2.7	5.3				9.3	6.7	2.7
ETHOLOGY & SOCIOBIOLOGY	13	31	74.2	67.7	6.5			19.4	15.4		6.5		6.5			
OTHER	34	82	87.8	58.5	18.3	8.5	2.4	2.4	2.4					9.8	6.1	3.7
FY 1971 PHD'S	234	853	72.5	55.4	11.5	3.2	2.5	13.2	4.6	8.6	5.7	3.9	1.8	8.6	3.8	4.8
FY 1972 PHD'S	239	894	68.2	51.7	9.8	1.8	4.9	10.1	4.7	5.4	8.5	8.0	.6	13.2	5.6	7.6
FY 1973 PHD'S	234	880	63.0	44.2	11.1	4.2	3.4	15.0	6.7	8.2	5.5	5.1	.3	16.6	9.0	7.5
FY 1974 PHD'S	240	927	66.8	49.2	12.1	2.0	3.5	14.0	8.4	5.6	6.0	4.4	1.6	13.2	10.6	2.6
FY 1975 PHD'S	405	1011	65.0	49.0	10.2	1.9	4.0	14.7	8.0	6.6	4.9	3.2	1.7	15.5	8.5	6.9
NIH/ADAMHA/HRA PREDOCS	1352	4565	67.0	49.8	10.9	2.6	3.7	13.4	6.6	6.9	6.1	4.9	1.2	13.5	7.6	5.9
MALE	897	3112	65.2	50.9	10.2	1.4	2.8	15.2	7.7	7.5	6.5	5.1	1.4	13.1	7.5	5.5
FEMALE	455	1453	70.8	47.5	12.4	5.2	5.7	9.6	4.1	5.4	5.2	4.3	.9	14.4	7.7	6.8

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[*] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA/

APP. E4.1 TIME SPENT ON RESEARCH AND OTHER WORK ACTIVITIES

	ALL EMPLOYED		PERCENT OF TIME SPENT IN						
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	R&D	TEACH	MGMT/ ADMIN	CON SULT	OTHER PROF SERV	OTHER ACTIVITY	PERCENT WITH SOME TIME IN RESEARCH
TOTAL BEHAVIORAL SCIENCES	3666	15362	24.3	32.0	14.8	8.5	18.1	2.3	78.1
ANTHROPOLOGY	321	1255	31.2	48.9	12.4	3.0	2.5	2.0	93.5
BIOLOGICAL & MEDICAL	51	188	35.0	50.5	6.5	3.0	3.6	1.4	98.4
CULTURAL & SOCIAL	234	921	30.5	51.0	11.5	2.9	1.9	2.3	93.3
OTHER	36	146	30.6	33.1	26.0	3.9	5.3	1.1	88.4
CLINICAL PSYCHOLOGY	611	4119	10.2	15.5	16.1	12.7	43.0	2.4	59.1
PSYCHOLOGY	2074	6957	29.5	34.6	14.4	8.0	10.9	2.6	81.4
COGNITIVE	110	422	37.5	32.4	11.6	8.8	7.1	2.6	82.0
COUNSELING & GUIDANCE	158	615	11.6	21.5	18.7	11.9	30.6	5.7	64.1
HUMAN DEVEL & GERONTOL	395	1165	25.2	39.0	13.7	6.7	12.0	3.4	82.8
HUMAN LEARNING & PERFORM	134	521	25.7	33.6	17.7	8.7	13.3	1.0	73.9
NEUROBEHAVIORAL SCIENCES	105	294	49.6	21.3	9.6	6.7	11.2	1.5	85.2
PERCEPTUAL & SENSORY	68	246	36.9	44.7	8.7	2.7	5.4	1.5	92.2
PERSONALITY & EXPERMNTL	46	226	23.6	34.4	16.5	8.8	15.9	0.8	81.0
PHYSIOL & COMPARATIVE	233	586	44.6	34.4	11.9	3.4	3.8	1.8	84.9
PSYCHOLINGUISTICS	37	116	39.6	40.9	11.3	1.8	3.7	2.8	94.7
PSYCHOPHYSICS & -METRICS	78	174	34.5	40.3	14.8	6.3	2.7	1.3	83.9
SOCIAL	403	1388	28.7	38.8	14.8	7.4	7.7	2.7	85.4
OTHER	307	1204	27.8	32.6	15.4	11.9	10.0	2.2	80.2
SOCIOLOGY	351	2054	30.7	43.2	14.3	6.4	4.3	1.2	92.8
COMPLEX ORGANIZ & PROF	69	468	28.5	39.2	17.0	11.2	3.1	1.0	93.3
CRIMINOLOGY&DEVIANT BEH	49	245	32.0	44.9	12.3	4.1	4.0	2.8	95.2
DEMOGRAPHY	38	190	37.8	31.9	15.0	8.7	5.6	1.1	88.9
MEDICAL	63	267	30.9	42.1	18.2	4.0	3.5	1.3	94.8
OTHER	132	924	29.9	47.5	12.0	4.7	5.0	0.8	92.0
OTHER BEHAVIORAL SCIENCES	309	937	23.9	38.7	16.4	5.3	13.6	2.1	84.2
COMMUNICATIONS SCIENCES	138	408	21.5	35.9	18.1	6.1	17.0	1.5	84.7
ETHOLOGY & SOCIOBIOLOGY	42	158	35.4	47.0	8.2	6.3	1.9	1.1	91.9
OTHER	129	371	21.9	38.4	17.9	4.0	14.6	3.3	80.4
FY 1971 PHD'S	572	2727	23.6	32.6	16.4	7.7	17.4	2.3	81.6
FY 1972 PHD'S	574	2845	22.6	34.0	17.4	7.4	16.6	2.0	76.3
FY 1973 PHD'S	646	2950	23.2	29.9	16.8	8.7	18.9	2.5	76.0
FY 1974 PHD'S	718	3406	25.9	31.9	11.8	9.9	18.4	2.1	77.3
FY 1975 PHD'S	1156	3434	25.8	32.0	12.6	8.4	18.8	2.4	79.6
NIH/ADAMHA/HRA PREDOCS	1334	4565	28.4	31.0	13.3	7.1	18.0	2.2	81.6
OTHER BEHAVIORAL PHD'S	2332	10797	22.6	32.5	15.4	9.0	18.1	2.3	76.7
MALE	2556	11005	24.6	31.6	15.8	8.6	17.4	2.0	79.8
FEMALE	1110	4357	23.7	33.2	12.4	8.0	19.7	3.0	74.0

APP. E4.2 TIME SPENT ON RESEARCH AND OTHER WORK ACTIVITIES BY TRAINEES/FELLOWS[a]

PHD FIELD/YEAR/SUPPORT/SEX	ALL EMPLOYED SURVEY RESP	ALL EMPLOYED EST TOTAL	PERCENT OF TIME SPENT IN R&D	TEACH	MGMT/ ADMIN	CON SULT	OTHER PROF SERV	OTHER ACTIVITY	PERCENT WITH SOME TIME IN RESEARCH
TOTAL BEHAVIORAL SCIENCES	1334	4565	28.5	31.0	13.3	7.1	18.0	2.2	81.6
ANTHROPOLOGY	127	385	32.6	47.4	12.3	3.4	2.6	1.6	94.8
BIOLOGICAL & MEDICAL	19	55	34.2	50.7	4.2	2.2	6.7	0.0	94.5
CULTURAL & SOCIAL	104	320	32.5	46.7	13.6	3.7	1.6	2.0	94.7
OTHER	4	10	27.5	50.5	20.0	1.0	1.0	0.0	100.0
CLINICAL PSYCHOLOGY	236	1548	13.0	17.4	15.3	11.2	40.0	3.0	64.3
PSYCHOLOGY	751	1901	38.2	36.1	11.1	4.9	7.9	1.7	89.3
COGNITIVE	42	127	47.9	38.0	6.8	1.5	3.1	2.9	95.9
COUNSELING & GUIDANCE	12	34	12.4	38.5	8.3	10.5	17.7	12.7	73.5
HUMAN DEVEL & GERONTOL	152	342	32.1	39.6	11.9	5.1	10.3	1.1	85.9
HUMAN LEARNING & PERFORM	44	129	29.3	38.9	12.3	7.6	11.2	0.7	86.0
NEUROBEHAVIORAL SCIENCES	57	146	52.1	19.3	7.1	5.5	15.7	0.4	80.4
PERCEPTUAL & SENSORY	27	76	39.5	41.1	8.2	2.0	4.9	4.3	86.3
PERSONALITY & EXPERMNTL	17	42	28.5	40.7	19.0	2.1	7.9	1.9	88.1
PHYSIOL & COMPARATIVE	109	243	53.1	30.7	8.7	1.3	3.8	2.4	91.1
PSYCHOLINGUISTICS	20	59	[illegible]	36.4	15.3	1.4	6.0	1.2	98.2
PSYCHOPHYSICS & -METRICS	20	33	50.2	26.1	10.0	7.9	4.7	1.2	100.0
SOCIAL	160	427	34.8	38.0	13.8	5.4	6.8	1.2	92.9
OTHER	91	243	32.9	39.5	10.5	8.5	7.1	1.5	89.2
SOCIOLOGY	141	543	36.4	39.0	13.8	4.9	4.1	1.9	94.1
COMPLEX ORGANIZ & PROF	21	91	22.8	50.5	14.7	8.5	3.1	0.5	90.8
CRIMINOLOGY&DEVIANT BEH	15	48	46.3	28.1	7.7	5.2	4.8	7.9	91.7
DEMOGRAPHY	22	86	48.7	29.7	15.7	3.9	0.9	1.2	98.8
MEDICAL	37	135	33.0	38.7	19.9	5.0	5.1	2.4	89.6
OTHER	46	183	37.1	41.2	12.3	3.4	5.2	0.9	97.6
OTHER BEHAVIORAL SCIENCES	79	188	26.5	36.3	18.7	8.7	8.7	1.2	86.6
COMMUNICATIONS SCIENCES	33	75	28.6	39.9	15.9	3.8	11.8	0.0	92.0
ETHOLOGY & SOCIOBIOLOGY	13	31	34.3	33.3	8.8	23.1	0.6	0.0	77.4
OTHER	33	82	21.5	34.0	25.1	7.8	8.9	2.7	85.0
FY 1971 PHD'S	231	853	30.0	29.8	15.7	7.6	14.6	2.3	88.2
FY 1972 PHD'S	231	894	28.1	31.1	15.4	7.0	16.5	1.8	76.5
FY 1973 PHD'S	235	880	26.6	30.8	13.9	7.3	19.6	1.8	79.8
FY 1974 PHD'S	238	927	27.0	33.7	10.8	6.7	19.4	2.4	78.5
FY 1975 PHD'S	399	1011	30.4	29.5	11.1	7.0	19.6	2.3	85.2
NIH/ADAMHA/HRA PREDOCS	1334	4565	28.5	31.0	13.3	7.1	18.0	2.2	81.6
OTHER BEHAVIORAL PHD'S									
MALE	884	3112	28.5	30.6	14.1	7.1	17.3	2.4	84.1
FEMALE	450	1453	28.4	31.8	11.5	7.1	19.6	1.6	76.3

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[a] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA.

APP. ES.1 ORIENTATION, HEALTH-RELATEDNESS, AND SUPPORT/SPONSORSHIP OF RESEARCH

PERCENT ENGAGED IN RESEARCH CHARACTERIZED AS

	RESEARCHERS		**ORIENTED**		**RELATED TO HEALTH**			***SUPPORTED OR SPONSORED BY***					
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	CLINICALLY	OTHER	DIRECTLY	INDIRECTLY	NOT AT ALL	NON FEDL	TOTAL FEDL	NIH	ADAMHA	HRA	OTHER FEDL
TOTAL BEHAVIORAL SCIENCES	2967	11725	48.3	51.7	42.3	40.6	17.1	64.1	35.9	10.8	8.0	1.4	20.2
ANTHROPOLOGY	300	1141	17.7	62.3	25.9	44.9	29.2	65.4	34.6	7.7	6.2	.5	24.3
BIOLOGICAL & MEDICAL	50	185	19.8	80.2	40.9	49.7	9.4	68.0	32.0	18.9	5.7	1.1	13.7
CULTURAL & SOCIAL	218	827	19.5	80.5	24.2	47.6	28.2	68.1	31.9	5.9	7.2	.4	22.2
OTHER	32	129	3.3	96.7	13.6	20.3	66.1	44.0	56.0	2.6			53.4
CLINICAL PSYCHOLOGY	362	2363	87.1	12.9	75.5	20.0	4.5	70.0	30.0	8.7	8.0	.5	16.7
PSYCHOLOGY	1722	5563	44.6	55.4	36.8	46.4	16.8	60.7	39.3	13.2	9.5	.8	20.7
COGNITIVE	94	336	35.4	64.6	20.1	47.7	32.1	60.1	39.9	15.2	8.2		19.5
COUNSELING & GUIDANCE	102	363	61.7	38.3	37.0	42.8	20.2	78.6	21.4	1.0	1.6		19.2
HUMAN DEVEL & GERONTOL	332	957	63.0	37.0	43.5	45.8	10.7	65.7	34.3	9.5	10.2	.4	18.0
HUMAN LEARNING & PERFORM	96	385	45.8	54.2	32.9	46.2	20.8	49.7	50.3	8.0	5.1	1.7	37.4
NEUROBEHAVIORAL SCIENCES	95	248	34.7	65.3	69.7	29.5	.9	32.9	67.1	31.7	20.8		23.8
PERCEPTUAL & SENSORY	63	224	35.0	65.0	31.3	53.1	15.6	67.4	32.6	20.0	.5		14.9
PERSONALITY & EXPERMNTL	39	183	63.4	36.6	43.9	45.7	10.4	62.5	37.5	5.9	12.5	2.0	23.7
PHYSIOL & COMPARATIVE	200	489	20.2	79.8	45.0	49.4	5.6	39.5	60.5	41.4	16.6	1.5	13.7
PSYCHOLINGUISTICS	34	168	40.8	59.2	18.6	67.6	13.7	62.7	37.3	26.5	9.8		4.9
PSYCHOPHYSICS & -METRICS	71	146	36.6	63.4	23.5	35.6	40.9	54.3	45.7	10.1	7.8	3.9	34.9
SOCIAL	350	1166	40.2	59.8	34.2	46.0	19.8	66.0	34.0	7.8	7.8	1.4	21.7
OTHER	246	958	44.6	55.4	31.5	49.0	19.5	65.1	34.9	7.2	10.5		19.9
SOCIOLOGY	323	1886	25.0	75.0	29.5	45.6	24.9	65.5	34.5	6.6	7.6	5.5	21.2
COMPLEX ORGANIZ & PROF	63	433	27.4	72.6	28.0	47.4	24.6	70.9	29.1	2.6	6.6	8.3	17.5
CRIMINOLOGY&DEVIANT BEH	46	220	31.6	68.4	16.9	47.8	35.4	59.4	40.6	3.1	15.1	2.1	29.7
DEMOGRAPHY	34	160	6.7	93.3	31.9	45.8	22.2	42.5	57.5	8.5	14.4	11.1	30.1
MEDICAL	58	253	44.9	55.1	70.4	25.9	3.6	64.3	35.7	13.3	9.6	12.9	9.6
OTHER	122	820	19.5	80.5	19.6	50.5	30.0	68.9	31.1	7.1	4.4	1.3	23.1
OTHER BEHAVIORAL SCIENCES	260	772	64.7	35.3	42.3	39.1	18.6	66.9	33.1	14.8	1.5		18.7
COMMUNICATIONS SCIENCES	117	344	82.1	17.9	49.4	36.2	14.4	65.8	34.2	14.8	1.3		20.1
ETHOLOGY & SOCIOBIOLOGY	38	136	3.2	56.8	8.5	50.0	41.5	58.9	41.1	17.7	1.6		25.0
OTHER	105	292	72.1	27.9	50.6	37.2	12.3	72.0	28.0	13.4	1.5		14.2
FY 1971 PHD'S	479	2166	51.2	48.8	45.6	38.2	15.9	65.1	34.9	11.1	8.0	2.1	18.2
FY 1972 PHD'S	455	2109	46.9	53.1	37.5	44.9	17.9	65.6	34.4	9.8	7.9	.8	21.1
FY 1973 PHD'S	513	2204	49.7	50.3	45.4	40.3	14.3	58.9	41.1	12.2	10.1	1.5	23.2
FY 1974 PHD'S	580	2564	47.3	52.7	42.2	39.0	18.8	66.6	33.4	10.0	6.7	1.4	19.7
FY 1975 PHD'S	940	2682	46.8	53.2	40.8	40.8	18.5	64.2	35.8	11.1	7.8	1.3	19.1
NIH/ADAMHA/HRA PREDOCS	1142	3646	52.1	47.9	50.3	40.0	9.7	59.5	40.5	15.6	12.0	1.9	16.9
OTHER BEHAVIORAL PHD'S	1825	8079	46.5	53.5	38.5	40.9	20.6	66.3	33.7	8.6	6.2	1.2	21.7
MALE	2119	8578	46.6	53.4	40.5	41.1	18.4	64.1	35.9	9.2	7.8	1.1	22.0
FEMALE	848	3147	52.8	47.2	47.4	39.2	13.4	64.3	35.7	15.6	8.7	2.4	15.2

APP. [illegible] ORIENTATION, HEALTH-RELATEDNESS, AND SUPPORT/SPONSORSHIP OF RESEARCH BY TRAINEES/FELLOWS[a]

PERCENT ENGAGED IN RESEARCH CHARACTERIZED AS

PHD FIELD/YEAR/SUPPORT/SEX	RESEARCHERS SURVEY RESP	RESEARCHERS EST TOTAL	**ORIENTED** CLINICALLY	**ORIENTED** OTHER	**RELATED TO HEALTH** DIRECTLY	**RELATED TO HEALTH** INDIRECTLY	**RELATED TO HEALTH** NOT AT ALL	***SUPPORTED OR SPONSORED BY*** NON FEDL	TOTAL FEDL	NIH	ADAMHA	HRA	OTHER FEDL
TOTAL BEHAVIORAL SCIENCES	1142	3646	52.1	47.9	50.3	40.0	9.7	59.5	40.5	15.6	12.0	1.9	16.9
ANTHROPOLOGY	120	347	19.8	80.2	36.2	49.5	14.2	64.9	35.1	12.7	14.9	.9	14.9
BIOLOGICAL & MEDICAL	18	52	24.5	75.5	44.2	42.3	13.5	71.2	28.8	19.2	5.8		15.4
CULTURAL & SOCIAL	98	285	19.6	80.4	33.0	52.1	14.9	62.3	37.7	11.9	17.3	1.2	15.4
OTHER	4	10		100.0	80.0	20.0		100.0					
CLINICAL PSYCHOLOGY	151	983	92.7	7.3	79.1	18.0	3.0	71.6	28.4	10.4	6.2		14.5
PSYCHOLOGY	672	1663	40.2	59.8	38.3	49.4	12.3	52.5	47.5	20.5	13.5	.9	18.3
COGNITIVE	40	118	39.8	60.2	14.8	46.1	39.1	54.4	45.6	23.2	7.9		23.2
COUNSELING & GUIDANCE	9	25	30.0	70.0	35.0	40.0	25.0	77.3	22.7				22.7
HUMAN DEVEL & GERONTOL	132	293	65.4	34.6	45.0	48.4	6.6	52.4	47.6	20.8	13.2	.7	19.8
HUMAN LEARNING & PERFORM	37	111	56.0	44.0	41.2	48.0	10.8	61.3	38.7	1.8	11.7	1.8	25.2
NEUROBEHAVIORAL SCIENCES	51	115	20.2	79.8	48.8	49.6	1.6	27.4	72.6	41.6	17.7		23.9
PERCEPTUAL & SENSORY	24	63	41.3	58.7	23.3	61.7	15.0	62.3	37.7	32.8	1.6		8.2
PERSONALITY & EXPERMNTL	15	37	51.4	48.6	21.6	64.9	13.5	67.6	32.4	14.7	2.9		14.7
PHYSIOL & COMPARATIVE	98	216	20.2	79.8	48.1	47.7	4.2	29.5	70.5	42.4	19.5	3.3	14.8
PSYCHOLINGUISTICS	19	56	34.7	65.3	20.8	58.5	20.8	60.7	39.3	25.0	17.9		3.6
PSYCHOPHYSICS & -METRICS	20	33	27.3	72.7	18.8	46.9	34.4	45.2	54.8	12.9	6.5	3.2	32.3
SOCIAL	147	381	33.1	66.9	38.2	47.5	14.3	60.0	40.0	11.1	12.6	.6	21.1
OTHER	80	215	43.7	56.3	40.3	50.7	9.0	62.3	37.7	11.6	18.1		11.0
SOCIOLOGY	131	492	30.0	70.0	43.9	44.3	11.8	54.8	45.2	9.9	16.2	10.1	19.7
COMPLEX ORGANIZ & PROF	19	79	38.0	62.0	36.7	45.6	17.7	62.3	37.7		22.1	3.9	22.1
CRIMINOLOGY&DEVIANT BEH	14	44	25.6	74.4	35.0	52.5	12.5	38.6	61.4	13.6	31.8	9.1	25.0
DEMOGRAPHY	21	85		100.0	36.2	47.8	15.9	46.2	53.8	14.1	7.7	19.2	23.1
MEDICAL	32	121	45.5	54.5	74.8	22.7	2.5	57.3	42.7	13.7	17.9	22.2	6.0
OTHER	45	163	29.5	70.5	29.7	56.3	13.9	58.0	42.0	6.9	17.8		25.5
OTHER BEHAVIORAL SCIENCES	68	161	76.6	23.4	59.7	34.9	5.4	66.9	33.1	18.5	5.3		12.6
COMMUNICATIONS SCIENCES	30	69	92.5	7.5	62.5	35.9	1.6	71.6	28.4	19.4	6.0		6.0
ETHOLOGY & SOCIOBIOLOGY	11	24	8.3	91.7	16.7	83.3		37.5	62.5	8.3	8.3		45.8
OTHER	27	68	85.7	14.3	73.8	14.8	11.5	73.3	26.7	21.7	3.3		6.7
FY 1971 PHD'S	211	724	55.2	44.8	51.0	39.7	9.2	60.8	39.2	16.4	13.1	4.6	12.6
FY 1972 PHD'S	191	659	48.1	51.9	47.4	40.9	11.7	56.3	43.7	14.1	14.6	.6	21.4
FY 1973 PHD'S	196	700	54.8	45.2	49.7	45.9	4.4	58.1	41.9	20.4	12.0	2.1	13.0
FY 1974 PHD'S	199	714	52.4	47.6	53.8	34.3	11.9	63.2	36.8	13.4	10.6	.7	16.9
FY 1975 PHD'S	345	849	49.9	50.1	49.7	39.2	11.1	59.0	41.0	14.3	10.4	1.5	19.5
NIH/ADAMHA/HRA PREDOCS	1142	3646	52.1	47.9	50.3	40.0	9.7	59.5	40.5	15.6	12.0	1.9	16.9
MALE	776	2562	49.4	50.6	49.4	40.6	10.0	62.2	37.8	12.9	11.2	1.2	18.2
FEMALE	366	1084	58.5	41.5	52.6	38.4	9.1	52.5	47.5	22.8	14.3	3.8	13.5

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[a] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA.

APP. E6. IMPORTANCE OF DOCTORATE AS CREDENTIAL FOR ATTAINING PRESENT POSITION

PHD FIELD/YEAR/SUPPORT/SEX	F-T EMPLOYED		PERCENT WHO CONSIDER DEGREE			
	SURVEY RESP	EST TOTAL	ESSEN TIAL	HELP FUL	NOT NEEDED	UNCER TAIN
TOTAL BEHAVIORAL SCIENCES	3367	14048	83.2	13.5	2.8	.5
ANTHROPOLOGY	299	1153	86.0	10.7	2.2	1.1
BIOLOGICAL & MEDICAL	48	179	88.0	9.1		2.9
CULTURAL & SOCIAL	217	834	87.3	9.2	3.0	.5
OTHER	34	140	75.7	21.4		2.9
CLINICAL PSYCHOLOGY	567	3694	89.0	9.9	1.1	
PSYCHOLOGY	1867	6323	79.9	15.6	4.1	.4
COGNITIVE	102	365	82.5	11.5	4.9	1.1
COUNSELING & GUIDANCE	155	579	76.5	21.1	2.4	
HUMAN DEVEL & GERONTOL	352	1055	78.5	19.5	1.8	.2
HUMAN LEARNING & PERFORM	123	488	72.8	18.9	7.8	.4
NEUROBEHAVIORAL SCIENCES	83	234	87.2	6.4	6.4	
PERCEPTUAL & SENSORY	61	223	77.6	11.2	9.9	1.3
PERSONALITY & EXPERMNTL	43	219	82.6	17.4		
PHYSIOL & COMPARATIVE	177	456	89.0	9.2	1.8	
PSYCHOLINGUISTICS	31	100	86.0	14.0		
PSYCHOPHYSICS & -METRICS	75	166	84.3	11.4	2.4	1.8
SOCIAL	383	1323	84.6	12.0	2.6	.8
OTHER	282	1115	73.2	18.8	7.6	.4
SOCIOLOGY	341	2035	81.1	15.9	2.2	.8
COMPLEX ORGANIZ & PROF	67	445	81.8	18.2		
CRIMINOLOGY&DEVIANT BEH	49	238	91.2	3.4	5.5	
DEMOGRAPHY	34	162	84.6	11.7		3.7
MEDICAL	61	262	81.3	15.3	3.4	
OTHER	130	898	77.4	18.9	2.5	1.2
OTHER BEHAVIORAL SCIENCES	293	873	84.3	12.0	3.1	.7
COMMUNICATIONS SCIENCES	132	384	85.7	8.9	3.9	1.6
ETHOLOGY & SOCIOBIOLOGY	39	140	91.4	8.6		
OTHER	122	349	79.8	16.8	3.5	
FY 1971 PHD'S	535	2469	86.4	11.4	1.9	.3
FY 1972 PHD'S	551	2685	86.0	11.2	2.5	.3
FY 1973 PHD'S	609	2743	83.4	13.9	2.5	.3
FY 1974 PHD'S	656	3085	79.8	16.3	3.0	.9
FY 1975 PHD'S	1016	3066	81.6	14.0	3.9	.5
NIH/ADAMHA/HRA PREDOCS	1201	4064	88.6	9.4	1.2	.8
OTHER BEHAVIORAL PHD'S	2166	9984	81.0	15.2	3.5	.3
MALE	2438	10448	84.0	12.9	2.8	.3
FEMALE	929	3600	81.0	15.3	2.9	.8

APP. E7 MINIMUM LEVEL OF TRAINING NEEDED TO FULFILL PRESENT JOB REQUIREMENTS

PHD FIELD/YEAR/SUPPORT/SEX	F-T EMPLOYED		PERCENT WHO CONSIDER LEVEL NEEDED				
	SURVEY RESP	EST TOTAL	POST DOC	MD/ PHD	MS/MA	BS/BA	OTHER
TOTAL BEHAVIORAL SCIENCES	3349	14048	4.9	77.7	14.7	1.5	1.2
ANTHROPOLOGY	296	1153	2.1	85.5	9.1	2.0	1.3
BIOLOGICAL & MEDICAL	49	179	2.2	96.1	1.7		
CULTURAL & SOCIAL	214	834	2.1	82.9	10.9	2.3	1.8
OTHER	33	140	2.2	86.8	8.1	2.9	
CLINICAL PSYCHOLOGY	565	3694	7.1	81.1	10.8	.3	.8
PSYCHOLOGY	1854	6323	5.9	73.1	17.5	2.0	1.5
COGNITIVE	101	365	9.9	77.2	8.8	1.4	2.7
COUNSELING & GUIDANCE	155	579	2.9	72.5	22.5		2.1
HUMAN DEVEL & GERONTOL	352	1055	6.6	73.9	18.2	.6	.8
HUMAN LEARNING & PERFORM	122	488	1.3	70.0	22.4	5.7	.6
NEUROBEHAVIORAL SCIENCES	83	234	19.2	70.1	10.3		.4
PERCEPTUAL & SENSORY	59	233	7.8	65.9	18.4	4.6	3.2
PERSONALITY & EXPERMNTL	43	219	5.9	67.1	26.0	.9	
PHYSIOL & COMPARATIVE	176	456	15.0	68.9	12.8	1.1	2.2
PSYCHOLINGUISTICS	31	100	3.0	85.0	12.0		
PSYCHOPHYSICS & -METRICS	75	166	5.4	83.7	7.2	3.6	
SOCIAL	377	1323	2.3	81.4	12.3	2.8	1.2
OTHER	280	1115	5.1	64.8	25.0	2.4	2.6
SOCIOLOGY	340	2005	1.2	79.5	16.3	1.6	1.5
COMPLEX ORGANIZ & PROF	67	445		85.8	9.2	3.4	1.6
CRIMINOLOGY&DEVIANT BEH	49	238		85.3	8.4	1.7	4.6
DEMOGRAPHY	34	162		84.0	14.8	1.2	
MEDICAL	60	262	3.5	75.7	19.3	1.5	
OTHER	130	898	1.6	75.1	21.4	.7	1.2
OTHER BEHAVIORAL SCIENCES	294	873	.7	82.1	15.0	1.6	.6
COMMUNICATIONS SCIENCES	131	384	1.0	83.0	14.1	.8	1.0
ETHOLOGY & SOCIOBIOLOGY	39	140		87.9	7.9	4.3	
OTHER	124	349	.6	78.8	18.9	1.4	.3
FY 1971 PHD'S	531	2469	5.3	82.2	10.0	1.1	1.3
FY 1972 PHD'S	550	2685	5.3	81.4	11.3	.6	1.4
FY 1973 PHD'S	604	2743	5.9	75.0	15.6	1.9	1.5
FY 1974 PHD'S	655	3085	5.6	74.4	17.5	1.8	.7
FY 1975 PHD'S	1009	3066	2.6	76.4	18.0	1.7	1.4
NIH/ADAMHA/HRA PREDOCS	1191	4064	6.4	82.4	5.4	.7	1.1
OTHER BEHAVIORAL PHD'S	2158	9984	4.3	75.7	16.9	1.8	1.3
MALE	2429	10448	4.6	78.2	14.2	1.8	1.3
FEMALE	920	3600	5.8	76.3	16.4	.6	.9

APP. E8 IMPORTANCE OF PREDOCTORAL RESEARCH EXPERIENCE TO PRESENT POSITION

PHD FIELD/YEAR/SUPPORT/SEX	F-T EMPLOYED SURVEY RESP	F-T EMPLOYED EST TOTAL	PERCENT WHO CONSIDER EXPERIENCE ESSENTIAL	USEFUL	NOT USEFL	UNCERTAIN
TOTAL BEHAVIORAL SCIENCES	3320	14048	47.8	43.7	6.9	1.6
ANTHROPOLOGY	297	1153	73.4	21.2	3.4	1.9
BIOLOGICAL & MEDICAL	49	179	75.4	19.0		5.6
CULTURAL & SOCIAL	215	834	71.7	22.1	4.7	1.5
OTHER	33	140	80.9	19.1		
CLINICAL PSYCHOLOGY	554	3694	25.2	58.8	14.5	1.5
PSYCHOLOGY	1846	6323	53.9	39.1	5.2	1.8
COGNITIVE	102	365	64.4	29.9	[illegible].8	
COUNSELING & GUIDANCE	152	579	26.9	55.8	8.1	9.2
HUMAN DEVEL & GERONTOL	349	1055	54.4	39.8	4.7	1.1
HUMAN LEARNING & PERFORM	123	488	42.6	44.9	10.9	1.6
NEUROBEHAVIORAL SCIENCES	81	234	76.5	22.2	1.3	
PERCEPTUAL & SENSORY	61	223	60.5	37.7	1.8	
PERSONALITY & EXPERMNTL	43	219	44.3	47.0	7.3	1.4
PHYSIOL & COMPARATIVE	175	456	63.5	33.4	2.9	.2
PSYCHOLINGUISTICS	30	100	81.6	7.1	11.2	
PSYCHOPHYSICS & -METRICS	74	166	76.8	20.1	1.8	1.2
SOCIAL	379	1323	62.1	33.4	3.0	1.5
OTHER	277	1115	45.0	47.5	6.1	1.5
SOCIOLOGY	336	2005	54.1	42.7	2.3	1.0
COMPLEX ORGANIZ & PROF	66	445	54.0	44.2	.9	.9
CRIMINOLOGY&DEVIANT BEH	49	238	60.5	37.4		2.1
DEMOGRAPHY	31	162	57.9	42.1		
MEDICAL	60	262	50.4	48.0		1.6
OTHER	130	898	52.8	42.0	4.6	.7
OTHER BEHAVIORAL SCIENCES	287	873	50.4	46.1	2.2	1.3
COMMUNICATIONS SCIENCES	131	384	45.9	48.6	3.9	1.6
ETHOLOGY & SOCIOBIOLOGY	38	140	71.6	26.1		2.2
OTHER	118	349	47.0	51.2	1.2	.6
FY 1971 PHD'S	527	2469	52.7	40.5	4.6	2.2
FY 1972 PHD'S	545	2685	47.9	43.2	7.8	1.1
FY 1973 PHD'S	595	2743	45.5	45.7	7.3	1.6
FY 1974 PHD'S	647	3085	47.8	43.6	7.3	1.3
FY 1975 PHD'S	1006	3066	45.8	45.2	7.3	1.8
NIH/ADAMHA/HRA PREDOCS	1184	4064	57.2	36.6	5.1	1.1
OTHER BEHAVIORAL PHD'S	2136	9984	43.9	46.6	7.6	1.8
MALE	2401	10448	47.2	44.9	6.6	1.2
FEMALE	919	3600	49.4	40.3	7.8	2.6

APP. E9 OVERALL RELEVANCE OF DOCTORAL DEGREE, TRAINING, AND RESEARCH EXPERIENCE TO PRESENT EMPLOYMENT SITUATION

	LABOR FORCE[a]		PERCENT WHO CONSIDER PHD		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	ESSENTIAL	USEFUL	NOT USED[b]
TOTAL BEHAVIORAL SCIENCES	3673	15252	85.2	9.6	5.1
ANTHROPOLOGY	341	1301	87.4	3.3	5.3
BIOLOGICAL & MEDICAL	55	203	91.1		8.9
CULTURAL & SOCIAL	249	949	85.4	4.1	10.5
OTHER	37	149	95.3	2.7	2.0
CLINICAL PSYCHOLOGY	639	4149	87.9	7.8	4.3
PSYCHOLOGY	2021	6776	82.9	12.1	5.0
COGNITIVE	110	404	85.6	9.2	5.2
COUNSELING & GUIDANCE	168	620	80.8	15.3	3.9
HUMAN DEVEL & GERONTGL	350	1155	84.1	10.9	5.0
HUMAN LEARNING & PERFORM	134	526	75.5	17.3	7.2
NEUROBEHAVIORAL SCIENCES	92	262	84.0	10.3	5.7
PERCEPTUAL & SENSORY	65	237	80.2	15.6	4.2
PERSONALITY & EXPERMNTL	49	235	80.0	14.0	6.0
PHYSIOL & COMPARATIVE	198	509	85.5	6.7	7.9
PSYCHOLINGUISTICS	37	116	78.4	12.9	8.6
PSYCHOPHYSICS & -METRICS	77	170	91.2	5.9	2.9
SOCIAL	405	1386	87.1	9.2	3.7
OTHER	296	1156	79.0	16.3	4.8
SOCIOLOGY	360	2132	86.4	8.6	5.0
COMPLEX ORGANIZ & PROF	71	472	88.8	6.1	5.1
CRIMINOLOGY&DEVIANT BEH	52	262	87.4	3.4	9.2
DEMOGRAPHY	37	188	84.0	8.0	8.0
MEDICAL	63	267	86.9	11.6	1.5
OTHER	137	943	85.3	10.5	4.2
OTHER BEHAVIORAL SCIENCES	312	934	84.9	11.2	3.9
COMMUNICATIONS SCIENCES	139	408	86.3	12.3	1.5
ETHOLOGY & SOCIOBIOLOGY	43	153	91.5	2.0	6.5
OTHER	130	373	80.7	13.9	5.4
FY 1971 PHD'S	565	2742	85.5	9.2	5.3
FY 1972 PHD'S	594	2860	87.8	8.3	3.9
FY 1973 PHD'S	660	2966	85.6	9.5	4.9
FY 1974 PHD'S	719	3372	84.6	10.2	5.3
FY 1975 PHD'S	1115	3332	83.2	10.7	6.1
NIH/ADAMHA/HRA PREDOCS	1307	4459	88.7	6.8	4.5
OTHER BEHAVIORAL PHD'S	2366	10833	83.[illegible]	10.8	5.3
MALE	2559	10928	87.[illegible]	8.8	4.0
FEMALE	1114	4364	80.[illegible]	11.8	7.9

[a] Labor force includes persons employed in positions other than postdoctoral appointments as well as unemployed persons who are seeking positions.

[b] Included under the "not used" category are persons unemployed or part-time employed who are actively seeking full-time positions, and also persons employed in positions in which they consider their doctoral training not useful.

APP. E10.1 REASON FOR TAKING POSTDOCTORAL APPOINTMENT WITHIN A YEAR AFTER EARNING DOCTORATE

	ALL PHD'S		PERCENT WHO HELD APPT	HELD POSTDOC		PERCENT TAKING APPT FOR			
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL		SURVEY RESP	EST TOTAL	RES EXPER	FIELD SWTCH	NO EMPL	OTHER REASC
TOTAL BEHAVIORAL SCIENCES	3892	15926	12.0	556	1907	42.0	10.8	19.4	27.8
ANTHROPOLOGY	359	1350	8.2	30	111	45.0	18.0	24.3	12.6
BIOLOGICAL & MEDICAL	57	209	10.0	6	21	71.4		14.3	14.3
CULTURAL & SOCIAL	265	992	8.5	23	84	34.5	23.8	28.6	13.1
OTHER	37	149	4.0	1	6	100.0			
CLINICAL PSYCHOLOGY	654	4237	10.4	73	442	28.6	1.2	16.3	54.0
PSYCHOLOGY	2189	7218	16.1	405	1163	44.6	15.3	18.4	21.6
COGNITIVE	116	433	15.9	17	69	50.8	8.5	18.6	22.0
COUNSELING & GUIDANCE	170	628	6.7	13	42	54.8	9.5		35.7
HUMAN DEVEL & GERONTOL	415	1210	12.1	55	147	34.0	17.7	14.3	34.0
HUMAN LEARNING & PERFORM	140	551	9.4	12	52	69.2	9.6	21.2	
NEUROBEHAVIORAL SCIENCES	116	316	45.9	57	145	56.6	4.9	26.6	11.9
PERCEPTUAL & SENSORY	74	264	20.1	19	53	39.6	17.0	28.3	15.1
PERSONALITY & EXPERMNTL	50	242	14.5	8	35	36.4	21.2	9.1	33.3
PHYSIOL & COMPARATIVE	251	624	44.2	121	276	55.5	17.5	17.2	9.9
PSYCHOLINGUISTICS	41	125	16.0	8	20	80.0	10.0		10.0
PSYCHOPHYSICS & -METRICS	80	178	19.7	10	35	8.6	5.7	11.4	74.3
SOCIAL	423	1435	8.1	37	116	31.9	11.2	11.2	45.7
OTHER	313	1212	14.3	48	173	29.5	27.7	27.7	15.0
SOCIOLOGY	366	2155	4.3	16	92	41.3		35.9	22.8
COMPLEX ORGANIZ & PROF	72	475	11.2	6	53	43.4		49.1	7.5
CRIMINOLOGY&DEVIANT BEH	53	266	3.4	2	9	44.4			55.6
DEMOGRAPHY	40	201	4.5	3	9	33.3		44.4	22.2
MEDICAL	63	267	6.4	4	17	47.1		17.6	35.3
OTHER	138	946	.4	1	4				100.0
OTHER BEHAVIORAL SCIENCES	324	966	10.2	32	99	66.7	2.0	24.2	7.1
COMMUNICATIONS SCIENCES	141	412	6.1	10	25	88.0		12.0	
ETHOLOGY & SOCIOBIOLOGY	44	160	30.6	11	49	65.3		34.7	
OTHER	139	394	6.3	11	25	48.0	8.0	16.0	28.0
FY 1971 PHD'S	606	2817	13.0	90	365	44.8	9.3	18.4	27.5
FY 1972 PHD'S	608	2920	12.4	88	363	40.5	17.6	14.6	27.3
FY 1973 PHD'S	679	3059	12.4	90	380	45.4	6.8	17.7	30.2
FY 1974 PHD'S	762	3523	9.9	102	350	33.0	15.8	23.6	27.6
FY 1975 PHD'S	1237	3607	12.4	186	449	45.2	5.8	22.4	26.6
NIH/ADAMHA/HRA PREDOCS	1404	4658	15.6	270	734	45.3	10.9	22.7	21.1
OTHER BEHAVIORAL PHD'S	2488	11228	10.4	286	1173	39.9	10.7	17.4	32.0
MALE	2679	11284	11.2	367	1263	45.3	10.8	22.1	21.8
FEMALE	1213	4642	13.9	189	644	35.7	10.7	14.3	39.3

APP. E10.2 REASON FOR TRAINEES/FELLOWS[a] TAKING POSTDOCTORAL APPOINTMENT WITHIN A YEAR AFTER EARNING DOCTORATE

	ALL PHD'S		PERCENT WHO HELD APPT	HELD POSTDOC		PERCENT TAKING APPT FOR			
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL		SURVEY RESP	EST TOTAL	RES EXPER	FIELD SWTCH	NC EMPL	OTHER REASON
TOTAL BEHAVIORAL SCIENCES	1404	4698	15.6	270	734	45.3	10.9	22.7	21.1
ANTHROPOLOGY	141	408	15.2	19	62	37.1	8.1	38.7	16.1
BIOLOGICAL & MEDICAL	20	58	15.5	2	9	66.7			33.3
CULTURAL & SOCIAL	117	340	15.6	17	53	32.1	9.4	45.3	13.2
OTHER	4	10							
CLINICAL PSYCHOLOGY	247	1583	9.1	25	144	24.2	3.8	18.9	53.0
PSYCHOLOGY	788	1958	22.9	199	448	48.9	15.0	21.9	14.3
COGNITIVE	44	129	17.1	9	22	36.4	22.7	27.3	13.6
COUNSELING & GUIDANCE	13	35	8.6	2	3	66.7	33.3		
HUMAN DEVEL & GERONTOL	160	359	18.1	27	65	43.1	15.4	10.8	30.8
HUMAN LEARNING & PERFORM	45	131	8.4	5	11	63.6	18.2	18.2	
NEUROBEHAVIORAL SCIENCES	62	156	44.9	32	70	60.0	8.6	20.0	11.4
PERCEPTUAL & SENSORY	29	79	29.1	10	23	47.8	17.4	34.8	
PERSONALITY & EXPERMNTL	19	46	17.4	4	8	25.0	12.5	37.5	25.0
PHYSIOL & COMPARATIVE	112	246	53.7	63	132	57.6	14.4	18.2	9.8
PSYCHOLINGUISTICS	21	59	15.3	4	9	77.8			22.2
PSYCHOPHYSICS & -METRICS	20	33	15.2	2	5		40.0	60.0	
SOCIAL	170	440	9.1	19	40	52.5	2.5	22.5	22.5
OTHER	93	245	24.5	22	60	25.0	26.7	36.7	11.7
SOCIOLOGY	145	550	5.8	8	32	59.4		21.9	18.8
COMPLEX ORGANIZ & PROF	24	98	12.2	2	12	100.0			
CRIMINOLOGY&DEVIANT BEH	15	48	8.3	1	4	100.0			
DEMOGRAPHY	22	86	10.5	3	9	33.3		44.4	22.2
MEDICAL	37	135	2.2	1	3			100.0	
OTHER	47	183	2.2	1	4				100.0
OTHER BEHAVIORAL SCIENCES	83	199	24.1	19	48	70.8	4.2	20.8	4.2
COMMUNICATIONS SCIENCES	34	77	13.0	5	10	100.0			
ETHOLOGY & SOCIOBIOLOGY	13	31	67.7	6	21	61.9		38.1	
OTHER	36	91	18.7	8	17	64.7	11.8	11.8	11.8
FY 1971 PHD'S	246	890	17.4	46	155	55.2	11.2	11.9	21.7
FY 1972 PHD'S	245	906	15.3	46	139	41.0	21.6	18.0	19.4
FY 1973 PHD'S	246	912	13.6	43	124	36.3	7.3	29.8	26.6
FY 1974 PHD'S	248	944	15.3	48	144	46.5	9.0	20.8	23.6
FY 1975 PHD'S	419	1046	16.4	87	172	45.9	6.4	32.0	15.7
NIH/ADAMHA/HRA PREDOCS	1404	4698	15.6	270	734	45.3	10.9	22.7	21.1
MALE	925	3177	14.9	174	474	47.4	10.8	25.8	16.0
FEMALE	479	1521	17.1	96	263	41.5	11.2	17.3	30.0

[a] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA.

APP. E11 PRIMARY SOURCE OF SUPPORT FOR CURRENT POSTDOCTORAL APPOINTMENT

PHD FIELD/YEAR/SUPPORT/SEX	POSTDOCS SURVEY RESP	POSTDOCS EST TOTAL	PERCENT WITH SUPPORT FROM FEDL FEL/ TRNG	FEDL RES GRANT	UNIV OR STATE	PER SONAL	OTHER/ UNKNOWN
TOTAL BEHAVIORAL SCIENCES	160	454	69.9	6.7	9.4	1.8	12.2
ANTHROPOLOGY	10	26	65.4	11.5		7.7	15.4
BIOLOGICAL & MEDICAL	1	3	100.0				
CULTURAL & SOCIAL	9	23	60.9	13.0		8.7	17.4
OTHER							
CLINICAL PSYCHOLOGY	9	56	64.8	3.7	22.2		9.3
PSYCHOLOGY	129	331	69.6	7.6	9.2	1.9	11.7
COGNITIVE	5	23	87.0				13.0
COUNSELING & GUIDANCE							
HUMAN DEVEL & GERONTOL	19	47	69.6		13.0		17.4
HUMAN LEARNING & PERFORM	3	16	70.0	30.0			
NEUROBEHAVIORAL SCIENCES	18	44	64.1	10.3			25.6
PERCEPTUAL & SENSORY	6	12	75.0		25.0		
PERSONALITY & EXPERMNTL							
PHYSIOL & COMPARATIVE	46	100	74.2	15.5	7.2	2.1	1.0
PSYCHOLINGUISTICS	3	7			71.4		28.6
PSYCHOPHYSICS & -METRICS	3	8			12.5		87.5
SOCIAL	10	22	59.1		4.5	18.2	18.2
OTHER	16	52	80.8	3.8	11.5		3.8
SOCIOLOGY	5	20	100.0				
COMPLEX ORGANIZ & PROF							
CRIMINOLOGY&DEVIANT BEH	1	4	100.0				
DEMOGRAPHY	3	13	100.0				
MEDICAL							
OTHER	1	3	100.0				
OTHER BEHAVIORAL SCIENCES	7	21	63.2				36.8
COMMUNICATIONS SCIENCES	2	4	100.0				
ETHOLOGY & SOCIOBIOLOGY	1	7					100.0
OTHER	4	10	100.0				
FY 1971 PHD'S	9	39	86.1		8.3		5.6
FY 1972 PHD'S	6	26	26.1		26.1		47.8
FY 1973 PHD'S	11	49	91.5	6.4	2.1		
FY 1974 PHD'S	33	114	55.6	14.8	13.9	1.9	13.9
FY 1975 PHD'S	101	226	74.2	4.5	7.2	2.7	11.3
NIH/ADAMHA/HRA PREDOCS	79	194	72.2	7.0	11.8	3.2	5.9
OTHER BEHAVIORAL PHD'S	81	260	68.1	6.5	7.7	.8	16.9
MALE	93	281	66.3	8.3	8.7	.8	15.9
FEMALE	67	173	75.4	4.1	10.5	3.5	6.4

APP. E12.1 TENURED AND POSTDOCTORAL POSITIONS WITHIN THE ACADEMIC LABOR FORCE

PHD FIELD/YEAR/SUPPORT/SEX	EMPLOYED IN ACADEMIC SECTOR SURVEY RESP	EMPLOYED IN ACADEMIC SECTOR EST TOTAL	PERCENT IN TENR POS	PERCENT IN TENR TRACK	PERCENT IN POST DOC	PERCENT IN OTHER NONTENR	POSTDOC FRACTION OF TOTAL RES TIME[a]
TOTAL BEHAVIORAL SCIENCES	2419	9417	27.1	49.6	3.8	19.5	.107
ANTHROPOLOGY	282	1077	34.4	48.0	2.1	15.6	.057
BIOLOGICAL & MEDICAL	48	175	40.0	43.4	1.7	14.9	.046
CULTURAL & SOCIAL	209	803	32.9	48.5	2.4	16.2	.068
OTHER	25	99	36.4	51.5		12.1	.000
CLINICAL PSYCHOLOGY	193	1262	16.2	44.8	2.7	36.3	.050
PSYCHOLOGY	1442	4750	25.1	50.3	5.9	18.8	.156
COGNITIVE	74	281	14.2	58.9	8.4	18.5	.201
COUNSELING & GUIDANCE	83	301	16.8	44.3		36.8	.000
HUMAN DEVEL & GERONTCL	205	859	26.3	51.3	3.4	19.0	.083
HUMAN LEARNING & PERFORM	74	289	32.9	39.8	3.5	23.9	.125
NEUROBEHAVIORAL SCIENCES	80	206	17.2	48.0	16.2	18.7	.247
PERCEPTUAL & SENSORY	56	213	29.1	55.2	5.9	9.9	.160
PERSONALITY & EXPERMNTL	34	163	15.3	63.2		21.5	.000
PHYSIOL & COMPARATIVE	181	446	17.5	46.7	20.6	15.2	.414
PSYCHOLINGUISTICS	32	104	10.8	68.6	6.9	13.7	.081
PSYCHOPHYSICS & -METRICS	48	124	41.0	44.3	5.7	9.0	.129
SOCIAL	294	1022	31.9	52.9	2.0	13.3	.035
OTHER	191	732	25.7	45.7	5.8	22.8	.181
SOCIOLOGY	275	1643	33.4	53.7	.5	12.5	.016
COMPLEX ORGANIZ & PROF	48	316	25.6	59.2		15.2	.000
CRIMINOLOGY&DEVIANT BEH	42	222	36.2	54.6	1.8	7.3	.060
DEMOGRAPHY	25	118	30.5	54.2	.8	14.4	.000
MEDICAL	50	218	34.4	41.7		23.9	.000
OTHER	110	769	35.9	54.4	.4	9.2	.014
OTHER BEHAVIORAL SCIENCES	227	685	33.9	46.1	2.8	17.1	.094
COMMUNICATIONS SCIENCES	99	290	37.3	42.9	1.4	18.5	.054
ETHOLOGY & SOCIOBIOLOGY	34	121	27.5	47.5	5.8	19.2	.144
OTHER	94	274	33.2	49.1	3.0	14.7	.105
FY 1971 PHD'S	407	1810	50.6	30.9	1.2	17.4	.041
FY 1972 PHD'S	409	1865	42.4	37.1	.5	20.0	.018
FY 1973 PHD'S	404	1635	23.8	55.2	2.5	18.5	.069
FY 1974 PHD'S	451	1993	13.6	62.7	5.1	18.6	.126
FY 1975 PHD'S	748	2114	8.2	60.3	9.0	22.4	.239
NIH/ADAMHA/HRA PREDOCS	954	2970	21.2	53.5	5.6	19.6	.128
OTHER BEHAVIORAL PHD'S	1465	6447	29.8	47.8	3.0	19.4	.095
MALE	1653	6600	30.0	49.6	3.0	17.4	.087
FEMALE	766	2817	20.2	49.5	5.9	24.4	.155

[a] Figures represent the postdoctoral proportion of the total manhours devoted to research by persons employed in the academic sector.

APP. E12.2 TENURED AND POSTDOCTORAL POSITION OF TRAINEES/FELLOWS[a] WITHIN THE ACADEMIC LABOR FORCE

	EMPLOYED IN ACADEMIC SECTOR		PERCENT IN				POSTDOC FRACTION OF TOTAL RES TIME[b]
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	TENR POS	TENR TRACK	POST DOC	OTHER NONTENR	
TOTAL BEHAVIORAL SCIENCES	954	2970	21.2	53.5	5.6	19.6	.128
ANTHROPOLOGY	114	330	29.3	56.4	3.7	10.7	.083
BIOLOGICAL & MEDICAL	18	49	53.1	46.9			.000
CULTURAL & SOCIAL	93	273	24.7	57.9	4.4	12.9	.101
OTHER	3	8	37.5	62.5			.000
CLINICAL PSYCHOLOGY	89	594	10.3	53.0	3.5	33.2	.061
PSYCHOLOGY	580	1466	19.7	55.1	8.4	16.5	.177
COGNITIVE	33	103	9.0	71.0	6.0	14.0	.122
COUNSELING & GUIDANCE	8	22		13.6		86.4	.000
HUMAN DEVEL & GERONTOL	117	268	19.8	58.5	3.6	18.2	.070
HUMAN LEARNING & PERFORM	29	97	33.0	41.2	5.2	20.6	.157
NEUROBEHAVIORAL SCIENCES	46	101	21.4	38.8	18.4	21.4	.243
PERCEPTUAL & SENSORY	24	68	4.7	65.6	14.1	15.6	.305
PERS[illegible]TY & EXPERMNTL	13	33	21.2	42.4		36.4	.000
PHYS[illegible] COMPARATIVE	91	199	15.7	49.5	21.2	13.6	.379
PSYCHOLINGUISTICS	17	53	3.9	78.4	7.8	9.8	.127
PSYCHOPHYSICS & -METRICS	10	16	12.5	75.0		12.5	.000
SOCIAL	125	328	21.3	61.4	3.4	13.9	.053
OTHER	67	178	31.5	47.8	9.0	11.8	.227
SOCIOLOGY	109	427	29.3	50.8	1.2	18.7	.030
COMPLEX ORGANIZ & PROF	17	71	26.8	59.2		14.1	.000
CRIMINOLOGY&DEVIANT BEH	11	41	18.9	48.6	10.8	21.6	.187
DEMOGRAPHY	14	49	30.6	63.3	2.0	4.1	.000
MEDICAL	28	110	31.8	32.7		35.5	.000
OTHER	39	156	30.8	56.4		12.8	.000
OTHER BEHAVIORAL SCIENCES	62	153	38.6	41.4	4.1	15.5	.111
COMMUNICATIONS SCIENCES	27	60	40.0	45.0	3.3	11.7	.082
ETHOLOGY & SOCIOBIOLOGY	10	23		72.7		27.3	.000
OTHER	25	70	50.8	27.0	6.3	15.9	.219
FY 1971 PHD'S	177	604	44.8	31.4	3.0	20.7	.085
FY 1972 PHD'S	167	586	29.2	48.4	1.1	21.4	.029
FY 1973 PHD'S	163	536	19.4	56.9	5.9	17.8	.128
FY 1974 PHD'S	171	604	9.4	66.4	7.1	17.1	.128
FY 1975 PHD'S	276	640	4.6	64.2	10.5	20.8	.251
NIH/ADAMHA/HRA PREDOCS	954	2970	21.2	53.5	5.6	19.6	.128
OTHER BEHAVIORAL PHD'S							
MALE	630	1977	24.0	55.4	4.8	15.8	.111
FEMALE	324	993	15.8	49.7	7.2	27.2	.160

[a] Includes all behavioral science Ph.D. recipients who received predoctoral training grant or fellowship support from ADAMHA, NIH, or HRA.

[b] Figures represent the postdoctoral proportion of the total manhours devoted to research by persons employed in the academic sector.

APP. E13 POSTDOCTORAL APPOINTEES CURRENTLY IN HOLDING STATUS IN SEARCH OF EMPLOYMENT

	POSTDOCS		PERCENT INDICATING			PERCENT SEEKING JOB		
PHC FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	TCTAL	APPT PRC LCNGD	APPT OVER 36 MOS	TOTAL	DISSAT WITH APPT	APPT ENDS SOON
TOTAL BEHAVIORAL SCIENCES	167	454	31.1	28.6	5.5	58.1	6.6	51.5
ANTHROPOLOGY	10	26	19.2	19.2		65.4		65.4
BIOLOGICAL & MECICAL	1	3						
CULTURAL & SOCIAL	9	23	21.7	21.7		73.9		73.9
OTHER								
CLINICAL PSYCHOLOGY	10	56	21.4	21.4		46.4	8.9	37.5
PSYCHOLOGY	134	331	34.7	31.4	7.6	57.1	5.4	51.7
COGNITIVE	5	23	34.8	34.8		60.9		60.9
COUNSELING & GUIDANCE								
HUMAN DEVEL & GERONTOL	20	47	21.3	21.3		48.9	12.8	36.2
HUMAN LEARNING & PERFORM	4	16				43.8		43.8
NEUROBEHAVIORAL SCIENCES	20	44	50.0	43.2	6.8	75.0	20.5	54.5
PERCEPTUAL & SENSORY	6	12				25.0		25.0
PERSONALITY & EXPERMNTL								
PHYSIOL & COMPARATIVE	47	100	47.0	41.0	12.0	67.0	3.0	64.0
PSYCHOLINGUISTICS	3	7	57.1	28.6	28.6	28.6		28.6
PSYCHOPHYSICS & -METRICS	3	8				12.5		12.5
SOCIAL	10	22	13.6	13.6		54.5		54.5
OTHER	16	52	40.4	40.4	15.4	51.9		51.9
SOCIOLOGY	5	20				75.0		75.0
COMPLEX ORGANIZ & PROF								
CRIMINOLOGY&DEVIANT BEH	1	4				100.0		100.0
DEMOGRAPHY	3	13				84.6		84.6
MECICAL								
OTHER	1	3						
OTHER BEHAVIORAL SCIENCES	8	21	42.9	42.9		81.0	33.3	47.6
COMMUNICATIONS SCIENCES	2	4				50.0		50.0
ETHOLOGY & SOCIOBIOLOGY	1	7	100.0	100.0		100.0	100.0	
OTHER	5	10	20.0	20.0		80.0		80.0
FY 1971 PHD'S	10	39	30.8	17.9	17.9	46.2		46.2
FY 1972 PHD'S	7	26	53.8	42.3	19.2	76.9	34.6	42.3
FY 1973 PHD'S	12	49	36.7	36.7	4.1	59.2	6.1	53.1
FY 1974 PHD'S	34	114	41.2	38.6	9.6	52.6	11.4	41.2
FY 1975 PHD'S	104	226	22.1	22.1		60.6	2.2	58.4
NIH/ADAMHA/HRA PREDOCS	82	194	32.5	29.9	5.7	55.2	1.0	54.1
	85	260	30.0	27.7	5.4	60.4	10.8	49.6
MALE	99	281	37.4	33.5	7.5	55.9	10.0	45.9
FEMALE	68	173	20.8	20.8	2.3	61.8	1.2	60.7

APP. E14 RELEVANCE OF CURRENT EMPLOYMENT FIELD TO DOCTORATE FIELD

PHD FIELD/YEAR/SUPPORT/SEX	ALL EMPLOYED SURVEY RESP	 EST TOTAL	PERCENT EMPLOYED IN PHD SPCLTY FIELD	 PHD BROAD FIELD	 OTHER FIELD	PERCENT INDICATING FIELDS RELATED CLOSE LY	 SOME WHAT	 NOT AT ALL
TOTAL BEHAVIORAL SCIENCES	3638	15362	67.5	24.6	7.9	75.8	21.7	2.5
ANTHROPOLOGY	321	1255	80.4	12.7	6.9	80.5	16.9	2.6
BIOLOGICAL & MEDICAL	51	188	69.7	16.0	14.4	81.4	15.4	3.2
CULTURAL & SOCIAL	234	921	84.3	10.2	5.5	79.4	18.1	2.5
OTHER	36	146	70.5	24.0	5.5	86.3	11.6	2.7
CLINICAL PSYCHOLOGY	600	4119	89.5	7.9	2.7	90.2	9.7	.1
PSYCHOLOGY	2059	6957	53.5	36.3	10.3	68.7	27.9	3.4
COGNITIVE	110	422	44.9	43.0	12.1	70.3	20.4	9.4
COUNSELING & GUIDANCE	158	615	46.8	45.9	7.2	80.2	18.2	1.7
HUMAN DEVEL & GERONTOL	390	1165	60.2	30.7	9.0	75.3	22.7	2.0
HUMAN LEARNING & PERFORM	133	521	38.3	46.4	15.3	55.7	42.3	1.9
NEUROBEHAVIORAL SCIENCES	104	294	53.6	28.0	18.3	71.2	22.9	5.8
PERCEPTUAL & SENSORY	67	246	60.4	30.0	9.6	60.7	34.8	4.5
PERSONALITY & EXPERMNTL	46	226	32.7	58.4	8.8	67.9	28.6	3.6
PHYSIOL & COMPARATIVE	232	586	41.8	41.1	17.0	62.4	31.9	5.7
PSYCHOLINGUISTICS	35	116	67.9	32.1		78.4	18.1	3.4
PSYCHOPHYSICS & -METRICS	77	174	50.3	39.3	10.4	59.9	38.4	1.7
SOCIAL	403	1388	60.5	32.9	6.6	68.8	29.3	2.0
OTHER	304	1204	58.7	31.0	10.4	66.0	29.9	4.1
SOCIOLOGY	349	2094	60.2	31.9	7.8	65.8	31.1	3.2
COMPLEX ORGANIZ & PROF	66	468	49.4	36.9	13.6	51.6	47.3	1.1
CRIMINOLOGY&DEVIANT BEH	51	245	83.3	8.6	8.2	83.6	14.7	1.7
DEMOGRAPHY	37	190	85.8	11.9	2.3	69.5	28.4	2.1
MEDICAL	63	267	57.3	27.7	15.0	56.6	34.8	8.6
OTHER	132	924	55.1	41.1	3.8	70.0	26.8	3.2
OTHER BEHAVIORAL SCIENCES	309	937	76.5	9.1	14.4	82.0	13.4	4.6
COMMUNICATIONS SCIENCES	137	408	85.9	3.2	10.9	87.8	9.8	2.5
ETHOLOGY & SOCIOBIOLOGY	42	158	45.9	20.3	33.8	52.5	29.7	17.7
OTHER	130	371	78.6	11.0	10.4	88.3	10.3	1.4
FY 1971 PHD'S	568	2727	65.4	25.4	9.2	72.4	25.0	2.6
FY 1972 PHD'S	574	2845	66.8	24.5	8.7	75.5	22.5	2.0
FY 1973 PHD'S	639	2950	69.7	22.8	7.4	76.7	20.5	2.9
Y 1974 PHD'S	711	3406	66.0	26.8	7.2	76.9	20.1	2.9
Y 1975 PHD'S	1146	3434	69.4	23.3	7.3	77.0	20.9	2.1
IH/ADAMHA/HRA PREDOCS	1330	4565	71.9	20.7	7.4	79.3	18.5	2.2
THER BEHAVIORAL PHD'S	2308	10797	65.6	26.2	8.1	74.3	23.0	2.6
ALE	2539	11065	68.3	23.8	8.0	75.8	21.5	2.7
EMALE	1099	4357	65.5	26.7	7.8	75.9	22.1	2.1

APP. E15 NET MOBILITY AMONG PHD AND EMPLOYMENT FIELDS

FIELD OF PHD/EMPLOYMENT	PHD'S AWARDED		CURRENTLY NOT EMPLOYED		SWITCH OUT OF FIELD		SWITCH INTO FIELD		TOTAL EMPLOYED IN FIELD	
	SURVEY RESP	EST TOTAL	N	%	N	%	N	%	N	%
TOTAL BEHAVIORAL SCIENCES	3789	15926	564	3.5	4827	30.3	4215	26.5	14750	92.6
ANTHROPOLOGY	348	1350	95	7.0	235	17.7	154	11.4	1170	86.7
BIOLOGICAL & MEDICAL	57	209	21	10.0	57	27.3	56	26.8	187	89.5
SOCIAL & CULTURAL	254	992	71	7.2	139	14.0	54	5.4	836	84.3
OTHER	37	149	3	2.0	43	28.9	44	29.5	147	98.7
CLINICAL PSYCHOLOGY	621	4237	118	2.8	412	9.7	892	21.1	4595	108.5
PSYCHOLOGY	2144	7218	261	3.6	3155	43.7	1958	27.1	5760	79.8
COGNITIVE	113	433	11	2.5	223	51.5	54	12.5	253	58.4
COUNSELING & GUIDANCE	162	628	13	2.1	301	47.9	246	39.2	560	89.2
HUMAN DEVEL & GERONTOL	406	1210	45	3.7	454	37.5	381	31.5	1092	90.2
HUMAN LEARNING & PERFORM	139	551	30	5.4	318	57.7	142	25.8	345	62.6
NEUROBEHAVIORAL SCIENCES	114	316	22	7.0	134	42.4	274	86.7	434	137.3
PERCEPTUAL & SENSORY	72	264	18	6.8	95	36.0	29	11.0	180	68.2
PERSONALITY & EXPERMNTL	50	242	16	6.6	152	62.8	56	23.1	130	53.7
PHYSICL & COMPARATIVE	247	624	38	6.1	331	53.0	57	9.1	312	50.0
PSYCHOLINGUISTICS	38	125	9	7.2	35	28.0	12	9.6	93	74.4
PSYCHOPHYSICS & -METRICS	79	178	4	2.2	86	48.3	21	11.8	109	61.2
SOCIAL	417	1435	47	3.3	539	37.6	112	7.8	961	67.0
OTHER	307	1212	8	.7	487	40.2	574	47.4	1291	106.5
SOCIOLOGY	357	2155	61	2.8	806	37.4	1024	47.5	2312	107.3
COMPLEX ORGANIZ & PROF	68	475	7	1.5	226	47.6	161	33.9	403	84.8
CRIMINOLOGY&DEVIANT BEH	53	266	21	7.9	41	15.4	287	107.9	491	184.6
DEMOGRAPHY	38	201	11	5.5	25	12.4	35	17.4	200	99.5
MEDICAL	63	267			114	42.7	98	36.7	251	94.0
OTHER	135	946	22	2.3	400	42.3	443	46.8	967	102.2
OTHER BEHAVIORAL SCIENCES	319	966	29	3.0	215	22.3	187	19.4	909	94.1
COMMUNICATIONS SCIENCES	139	412	4	1.0	57	13.8	74	18.0	425	103.2
ETHOLOGY & SOCIOBIOLOGY	43	160	2	1.3	80	50.0	38	23.8	116	72.5
OTHER	137	394	23	5.8	78	19.8	75	19.0	368	93.4

APP. E16.1 PRIMARY SOURCES OF SUPPORT IN FIRST AND SECOND YEARS OF GRADUATE SCHOOL

	ALL PHD'S		PERCENT SUPPORTED IN FIRST YEAR BY						PERCENT SUPPORTED IN SECOND YEAR BY					
			--TRG/FELL--		FEDL	UNIV			--TRG/FELL--		FEDL	UNIV		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKNOWN	NIH/ ADAMHA	OTHER FEDL	RES GRANT	CR STATE	PER SONAL	OTHER/ UNKNOWN
TOTAL BEHAVIORAL SCIENCES	3860	15926	15.2	16.4	5.4	30.5	26.9	5.6	16.9	20.5	6.4	33.3	17.9	5.1
ANTHROPOLOGY	355	1350	10.2	16.5	2.5	27.4	37.6	5.9	16.2	20.4	2.7	37.3	20.4	3.0
BIOLOGICAL & MEDICAL	56	209	15.0	6.8	1.9	36.9	35.9	3.4	16.5	6.3	1.9	48.5	19.4	7.3
CULTURAL & SOCIAL	263	992	10.7	17.7	2.3	25.6	37.9	5.9	18.1	22.4	2.8	34.4	20.1	2.4
OTHER	36	149		22.4	4.1	25.9	38.1	9.5	3.4	26.5	2.7	40.8	23.8	2.7
CLINICAL PSYCHOLOGY	648	4237	22.6	15.4	2.1	25.1	30.5	4.3	21.3	20.1	4.0	28.7	20.6	5.3
PSYCHOLOGY	2174	7218	13.0	17.4	7.9	31.3	25.0	5.5	15.3	21.0	9.0	32.6	17.4	4.7
COGNITIVE	114	433	12.1	24.3	13.1	34.3	12.9	3.3	15.1	27.4	9.0	31.6	10.0	7.0
COUNSELING & GUIDANCE	167	628	2.0	21.3	4.9	20.9	46.5	4.4	1.9	27.7	3.2	31.8	32.3	3.1
HUMAN DEVEL & GERONTOL	412	1210	15.4	13.9	5.6	27.9	31.6	5.6	19.2	18.3	7.0	28.4	24.0	3.2
HUMAN LEARNING & PERFORM	140	551	10.3	12.5	18.3	29.6	25.6	3.6	13.8	20.0	13.2	30.5	17.1	5.4
NEUROBEHAVIORAL SCIENCES	116	316	22.5	21.5	8.2	31.6	10.8	5.4	30.7	25.3	11.4	22.2	6.0	4.4
PERCEPTUAL & SENSORY	73	264	15.6	19.5	12.2	40.1	10.7	1.9	16.0	29.4	18.3	27.9	4.2	4.2
PERSONALITY & EXPERMNTL	50	242	14.9	8.3	3.7	31.0	35.1	7.0	9.5	8.3	7.5	36.8	26.9	10.7
PHYSIOL & COMPARATIVE	250	624	22.7	16.2	13.8	31.3	11.5	4.5	25.8	19.3	14.6	32.1	5.8	2.4
PSYCHOLINGUISTICS	41	125	10.4	26.4	1.6	28.8	17.6	15.2	16.8	35.2	7.2	22.4	8.0	10.4
PSYCHOPHYSICS & -METRICS	80	178	10.7	18.0	12.9	27.5	19.1	11.8	10.1	19.7	16.5	32.6	15.2	5.6
SOCIAL	421	1435	13.1	19.0	4.9	36.8	20.9	5.3	15.4	21.7	6.7	37.4	14.2	4.6
OTHER	310	1212	9.5	16.5	5.3	32.3	29.5	6.8	11.2	16.4	8.7	36.9	21.3	5.4
SOCIOLOGY	361	2155	12.7	11.5	6.0	39.5	22.6	7.7	15.0	16.5	4.4	42.5	14.0	7.6
COMPLEX ORGANIZ & PROF	71	475	7.7	4.7	5.1	43.7	28.4	10.4	11.5	15.6	6.6	38.2	17.1	11.1
CRIMINOLOGY&DEVIANT BEH	52	266	3.8	10.7	8.8	34.5	37.5	4.6	8.6	18.8	8.2	39.5	21.9	3.1
DEMOGRAPHY	40	201	18.4	11.9	7.0	36.8	5.5	20.4	16.4	12.9	2.0	41.8	8.0	18.9
MEDICAL	63	267	32.2	21.3	2.2	21.0	17.2	6.0	31.8	18.9	1.5	30.7	10.6	6.4
OTHER	135	946	10.9	12.3	6.5	44.7	20.7	4.9	13.4	16.4	3.7	49.0	12.6	4.9
OTHER BEHAVIORAL SCIENCES	322	966	11.9	24.6	4.8	32.1	20.3	6.3	14.2	27.3	7.3	32.7	13.9	4.7
COMMUNICATIONS SCIENCES	139	412	11.4	27.9	4.7	26.9	24.6	4.5	14.7	31.2	6.1	30.2	13.3	4.4
ETHOLOGY & SOCIOBIOLOGY	44	160	3.1	11.9	8.1	60.0	4.4	12.5	11.3	11.9	11.5	54.4	4.4	6.5
OTHER	139	394	16.0	26.4	3.6	26.1	22.3	5.6	14.7	29.4	6.6	26.4	18.5	4.4
FY 1971 PHD'S	599	2817	14.4	15.8	6.0	32.1	25.3	6.5	18.9	18.8	6.8	32.3	17.2	6.2
FY 1972 PHD'S	601	2920	13.8	17.4	5.1	32.1	27.8	3.9	16.3	20.7	7.4	34.0	17.5	4.2
FY 1973 PHD'S	674	3059	16.6	16.4	4.3	26.6	29.7	6.4	17.4	21.8	5.7	31.3	18.3	5.5
FY 1974 PHD'S	755	3523	14.0	18.1	6.2	28.4	27.7	5.4	15.4	22.9	6.5	32.0	16.5	4.7
FY 1975 PHD'S	1231	3607	16.9	14.5	5.5	33.2	24.2	5.6	16.8	18.1	6.0	36.4	17.7	5.0
NIH/ADAMHA/HRA PREDOCS	1397	4658	51.3	8.5	3.5	21.3	11.2	4.2	56.9	11.5	[illegible]	22.2	3.7	2.3
OTHER BEHAVIORAL PHD'S	2463	11228		19.7	6.3	34.3	33.5	6.1		24.2	7.7	37.9	23.8	6.3
MALE	2657	11284	14.9	15.9	6.0	30.2	27.7	5.3	15.7	20.0	6.5	33.9	18.0	5.4
FEMALE	1203	4642	15.8	17.8	4.2	31.2	24.9	6.2	19.7	21.6	5.3	31.6	17.5	4.4

APP. E16.2 PRIMARY SOURCES OF SUPPORT IN THIRD AND FOURTH YEARS OF GRADUATE SCHOOL

PHD FIELD/YEAR/SUPPORT/SEX	ALL PHD'S SURVEY RESP	ALL PHD'S EST TOTAL	PERCENT SUPPORTED IN THIRD YEAR BY --TRG/FELL-- NIH/ ADAMHA	 OTHER FEDL	 FEDL RES GRANT	 UNIV OR STATE	 PER SONAL	 OTHER/ UNKN	PERCENT SUPPORTED IN FOURTH YEAR BY --TRG/FELL-- NIH/ ADAMHA	 OTHER FEDL	 FEDL RES GRANT	 UNIV OR STATE	 PER SONAL	 OTHER/ UNKN
TOTAL BEHAVIORAL SCIENCES	3846	15926	19.1	21.0	6.5	30.0	17.0	6.3	18.3	16.5	7.3	29.3	20.3	8.3
ANTHROPOLOGY	355	13[illegible]0	19.2	21.0	4.0	33.4	15.5	7.0	25.2	12.0	5.5	26.3	19.3	11.2
BIOLOGICAL & MEDICAL	56	209	22.3	5.3	1.5	44.7	16.5	9.7	20.5	6.5	9.0	30.0	27.0	7.0
CULTURAL & SOCIAL	263	992	20.9	23.6	4.7	28.7	15.1	7.0	29.2	12.9	6.2	21.8	17.8	12.2
OTHER	36	149	3.4	25.9	2.7	49.0	16.3	2.7	6.8	14.4		50.0	17.8	11.0
CLINICAL PSYCHOLOGY	645	4237	22.4	22.1	3.9	24.7	20.4	6.5	17.0	17.9	4.5	27.7	22.2	10.3
PSYCHOLOGY	2166	7218	18.0	21.0	8.7	30.1	16.4	5.7	18.7	15.2	9.5	29.0	21.1	6.6
COGNITIVE	115	433	21.3	30.2	10.2	20.0	10.7	7.7	21.2	22.2	13.1	22.4	14.8	6.4
COUNSELING & GUIDANCE	165	628	3.5	22.8	5.8	35.1	29.0	3.8	2.8	20.8	3.7	37.6	31.3	3.9
HUMAN DEVEL & GERONTOL	409	1210	20.5	17.9	5.9	29.0	19.8	6.5	19.7	13.8	7.7	24.9	28.3	8.5
HUMAN LEARNING & PERFORM	138	551	16.0	21.1	12.7	27.7	18.2	4.4	15.8	14.1	7.2	33.4	23.6	5.9
NEUROBEHAVIORAL SCIENCES	116	316	34.5	25.6	10.8	18.4	5.1	5.7	38.3	23.1	9.7	14.6	8.1	6.2
PERCEPTUAL & SENSORY	72	264	20.0	32.3	14.2	18.5	10.0	5.0	24.4	24.0	14.0	21.6	11.6	4.4
PERSONALITY & EXPERMNTL	50	242	10.7	12.0	14.9	27.7	20.2	14.5	9.3	2.8	10.7	28.0	35.0	14.0
PHYSIOL & COMPARATIVE	250	624	28.0	18.0	12.8	32.1	4.4	4.7	26.4	12.4	10.6	38.5	8.9	3.2
PSYCHOLINGUISTICS	41	125	28.0	21.6	5.6	20.8	5.6	10.4	43.5	8.3	13.5	13.0	11.1	10.2
PSYCHOPHYSICS & -METRICS	80	178	9.6	20.2	13.5	35.4	16.3	5.1	12.9	16.6	14.7	29.4	18.4	8.0
SOCIAL	421	1435	19.1	23.6	5.9	31.4	14.7	5.3	19.7	15.8	6.6	27.7	20.2	8.0
OTHER	309	1212	12.8	16.7	7.9	37.4	20.8	4.4	14.3	14.1	10.6	33.3	22.6	5.1
SOCIOLOGY	360	2155	18.0	15.2	5.3	37.9	14.7	8.8	17.7	17.6	5.7	34.9	15.2	8.9
COMPLEX ORGANIZ & PROF	71	475	15.5	11.0	7.0	37.6	17.4	11.5	11.0	12.9	10.2	34.5	18.1	13.3
CRIMINOLOGY&DEVIANT BEH	51	266	14.1	16.4	7.4	41.8	20.3		11.4	17.7	5.5	40.9	19.8	4.6
DEMOGRAPHY	40	201	19.9	9.5		33.3	8.0	29.4	29.4	7.5	2.5	25.9	4.5	30.3
MEDICAL	62	267	37.9	19.3	6.4	17.4	14.8	4.2	46.7	13.6	5.1	12.1	18.7	3.7
OTHER	136	946	14.3	17.1	4.6	43.8	13.3	6.9	12.9	23.1	4.4	41.0	14.3	4.2
OTHER BEHAVIORAL SCIENCES	320	966	14.5	26.4	8.5	30.7	14.2	3.5	12.6	23.8	9.2	30.9	17.5	6.1
COMMUNICATIONS SCIENCES	139	412	13.6	[illegible]	7.4	26.2	16.0	3.5	11.7	28.9	8.9	23.1	21.1	6.3
ETHOLOGY & SOCIOBIOLOGY	44	160	13.8	[illegible]	12.5	42.5	2.1	4.4	13.3	13.3	21.9	44.3	3.2	4.4
OTHER	137	394	15.7	25.8	8.0	30.7	16.8	3.1	13.1	23.5	4.1	32.5	20.2	6.6
FY 1971 PHD'S	598	2817	22.0	21.4	6.4	30.0	13.9	6.3	22.3	19.4	7.6	25.8	16.3	8.5
FY 1972 PHD'S	598	2920	19.4	22.4	7.7	28.3	17.3	5.0	22.5	18.4	7.2	24.7	20.8	6.4
FY 1973 PHD'S	671	3059	19.6	22.2	5.5	29.7	15.6	7.4	17.4	18.5	6.3	28.8	19.0	10.1
FY 1974 PHD'S	757	3523	17.3	21.3	6.9	28.8	15.1	6.5	14.2	15.2	8.4	31.4	22.1	8.7
FY 1975 PHD'S	1222	3607	17.8	18.2	6.[illegible]	33.0	18.5	6.3	16.8	12.4	7.0	34.0	22.1	7.7
NIH/ADAMHA/HRA PREDOCS	1398	4698	64.0	10.5	2.7	16.3	2.5	3.0	60.9	7.9	4.2	15.8	7.0	4.2
OTHER BEHAVIORAL PHD'S	2448	11228		29.4	8.2	35.9	22.8	7.7		20.2	8.6	35.1	26.0	10.0
MALE	2650	11284	17.5	21.7	7.0	30.8	16.6	6.5	16.4	16.8	8.0	31.7	18.8	8.1
FEMALE	1196	4642	22.8	19.4	5.4	28.3	18.2	6.0	22.6	15.8	5.6	23.4	24.0	8.6

APP. E19 DEPENDENCE ON FEDERAL SUPPORT TO COMPLETE PHD PROGRAM

PHD FIELD/YEAR/SUPPORT/SEX	RECEIVED SOME FEDL SUPPORT		PERCENT WHO WITHOUT SUPPORT FELT THEY COULD		
	SURVEY RESP	EST TOTAL	EARN PHD	NOT EARN PHD	UNCERTAIN
TOTAL BEHAVIORAL SCIENCES	2818	10718	22.4	49.0	28.7
ANTHROPOLOGY	264	913	23.0	50.9	26.1
BIOLOGICAL & MEDICAL	35	111	25.2	43.2	31.5
CULTURAL & SOCIAL	208	725	21.7	54.6	23.7
OTHER	21	77	32.5	27.3	40.3
CLINICAL PSYCHOLOGY	450	2954	25.6	43.5	30.9
PSYCHOLOGY	1602	4849	20.1	50.5	29.3
COGNITIVE	86	309	13.3	54.0	32.7
COUNSELING & GUIDANCE	95	337	28.8	42.4	28.8
HUMAN DEVEL & GERONTOL	300	789	16.2	55.6	28.1
HUMAN LEARNING & PERFORM	102	383	19.6	58.0	22.5
NEUROBEHAVIORAL SCIENCES	103	277	15.9	55.2	28.9
PERCEPTUAL & SENSORY	60	208	18.8	48.6	32.7
PERSONALITY & EXPERMNTL	35	127	32.3	48.8	18.9
PHYSIOL & COMPARATIVE	204	495	15.6	52.9	31.5
PSYCHOLINGUISTICS	31	90	11.1	70.0	18.9
PSYCHOPHYSICS & -METRICS	58	126	23.0	55.6	21.4
SOCIAL	323	967	17.7	45.0	37.3
OTHER	205	741	30.1	45.1	24.8
SOCIOLOGY	261	1280	23.9	51.3	24.8
COMPLEX ORGANIZ & PROF	45	245	27.8	46.9	25.3
CRIMINOLOGY&DEVIANT BEH	37	159	28.9	40.9	30.2
DEMOGRAPHY	30	127	34.6	57.5	7.9
MEDICAL	57	232	13.8	65.1	21.1
OTHER	92	517	22.4	48.9	28.6
OTHER BEHAVIORAL SCIENCES	241	682	20.4	54.8	24.8
COMMUNICATIONS SCIENCES	104	292	9.9	61.6	28.4
ETHOLOGY & SOCIOBIOLOGY	36	123	46.3	39.0	14.6
OTHER	101	267	19.9	54.7	25.5
FY 1971 PHD'S	468	1970	18.7	50.8	30.5
FY 1972 PHD'S	453	1983	22.3	50.3	27.4
FY 1973 PHD'S	505	2122	24.6	46.6	28.8
FY 1974 PHD'S	547	2332	23.1	48.7	28.2
FY 1975 PHD'S	845	2311	22.8	48.8	28.5
NIH/ADAMHA/HRA PREDOCS	1386	4642	16.4	54.8	28.8
OTHER BEHAVIORAL PHD'S	1432	6076	26.9	44.5	28.6
MALE	1940	7582	24.6	46.8	28.6
FEMALE	878	3136	16.9	54.3	28.8

APP. E18 INFLUENCE OF THE AVAILABILITY OF FINANCIAL ASSISTANCE ON THE SELECTION OF A PH.D. FIELD

	ALL PHD'S		PERCENT INDICATING AVAILABILITY HAD		
PHD FIELD/YEAR/SUPPORT/SEX	SURVEY RESP	EST TOTAL	SOME EFFECT	NO EFFCT	UNCERTAIN
TOTAL BEHAVIORAL SCIENCES	3779	15926	22.9	71.4	5.7
ANTHROPOLOGY	354	1350	15.4	80.4	4.2
BIOLOGICAL & MEDICAL	56	209	27.2	70.9	1.9
CULTURAL & SOCIAL	262	992	13.8	80.9	5.3
OTHER	36	149	9.8	90.2	
CLINICAL PSYCHOLOGY	628	4237	20.0	75.9	4.1
PSYCHOLOGY	2126	7218	25.2	67.8	7.0
COGNITIVE	113	433	25.1	66.8	8.1
COUNSELING & GUIDANCE	163	628	29.7	63.2	7.2
HUMAN DEVEL & GERONTOL	399	1210	28.2	65.9	5.9
HUMAN LEARNING & PERFORM	134	551	25.7	68.0	6.3
NEUROBEHAVIORAL SCIENCES	116	316	25.9	68.4	5.7
PERCEPTUAL & SENSORY	72	264	27.0	69.5	3.5
PERSONALITY & EXPERMNTL	47	242	25.6	74.4	
PHYSIOL & COMPARATIVE	248	624	27.1	64.7	8.2
PSYCHOLINGUISTICS	39	125	16.8	64.7	18.5
PSYCHOPHYSICS & -METRICS	79	178	32.4	61.4	6.3
SOCIAL	415	1435	21.0	70.4	8.6
OTHER	301	1212	23.1	70.2	6.7
SOCIOLOGY	353	2155	23.0	71.0	5.9
COMPLEX ORGANIZ & PROF	71	475	10.8	76.3	12.9
CRIMINOLOGY&DEVIANT BEH	47	266	11.5	86.3	2.2
DEMOGRAPHY	40	201	31.8	62.2	6.0
MEDICAL	62	267	46.8	52.1	1.1
OTHER	133	946	23.3	72.0	4.6
OTHER BEHAVIORAL SCIENCES	318	966	29.0	65.8	5.2
COMMUNICATIONS SCIENCES	139	412	32.4	61.4	6.2
ETHOLOGY & SOCIOBIOLOGY	44	160	17.5	77.5	5.0
OTHER	135	394	30.3	65.5	4.2
FY 1971 PHD'S	591	2817	22.4	71.2	6.4
FY 1972 PHD'S	590	2920	22.0	74.2	3.7
FY 1973 PHD'S	660	3059	23.9	70.8	5.3
FY 1974 PHD'S	740	3523	21.3	72.8	5.9
FY 1975 PHD'S	1198	3607	24.8	68.1	7.1
NIH/ADAMHA/HRA PREDOCS	1403	4658	27.5	65.0	7.1
OTHER BEHAVIORAL PHD'S	2376	11228	20.8	74.1	5.1
MALE	2608	11284	23.8	71.4	4.8
FEMALE	1171	4642	20.9	71.3	7.9

APP. E19 TRENDS IN U.S. DOCTORATE PRODUCTION IN THE BEHAVIORAL SCIENCES
(FIGURES EXCLUDE DEGREES AWARDED TO PERSONS PLANNING FOREIGN EMPLOYMENT)

FIELD OF DOCTORATE	FISCAL YEAR OF DOCTORATE 1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
TOTAL BEHAVIORAL SCIENCES	956	988	1055	1117	1218	1209	1403	166[illegible]	[illegible]868	2258	2556	2955	3115	3374	3576	3698	3971
ANTHROPOLOGY	62	46	70	68	66	74	82	138	127	159	194	217	231	299	346	354	386
CLINICAL PSYCHOLOGY	236	293	283	295	388	329	364	410	472	514	533	601	667	731	760	790	863
PSYCHOLOGY	508	501	535	566	582	593	720	826	936	1168	1264	1424	1514	1660	1763	1847	1918
COUNSELING & GUIDANCE	65	65	58	47	45	44	56	77	100	103	110	142	148	198	196	226	257
DEVELOPMENTAL & GERONTOL	22	20	26	20	17	26	39	44	60	66	80	103	129	144	154	164	184
EDUCATIONAL & SCHOOL	65	88	61	52	57	49	57	85	92	104	129	164	206	220	239	233	262
GENERAL PSYCHOLOGY	26	25	15	16	13	31	26	39	68	122	115	117	125	151	249	232	211
PERSONALITY & EXPERMNTL	191	188	205	218	251	238	290	297	313	335	397	421	386	367	403	394	401
PHYSIOL & COMPARATIVE		1	36	65	45	48	74	97	106	120	128	134	129	140	132	140	150
PSYCHOMETRICS	15	18	18	14	19	16	25	15	17	16	15	34	21	24	23	15	24
SOCIAL	78	62	74	87	82	97	93	99	116	177	138	157	165	207	169	214	195
OTHER	46	34	42	47	53	44	60	73	64	125	152	152	205	209	208	229	234
SOCIOLOGY	151	148	167	187	182	213	237	294	333	353	449	527	576	527	581	596	663
SPEECH & HEARING SCI				1						64	116	186	127	157	126	111	141

SOURCE: NRC, Survey of Earned Doctorates, Washington, D.C., 1960-76.

APPENDIX F

DATA RELATING TO THE ANALYSIS OF ACADEMIC DEMAND FOR BEHAVIORAL SCIENCE PH.D.'S

APP. F1 Determinants of Academic Employment for Behavioral Ph.D.'s

Fiscal Year	Enrollments: Total Behavioral Grad. and Undergrad. (S)	Enrollments: Behavioral Graduate[a]	Enrollments: Estimated Behavioral Undergrad.[b]	Total Behavioral B.A.'s [c]	Ratio of Behavioral B.A.'s to Total B.A.'s	Estimated Behavioral Academically Employed Ph.D.'s (excl. postdocs)[e] (F)	Ratio of Behav. Academically Employed Ph.D.'s to Total Behavioral Enrollment (F/S)	Behav. Science R and D in Colleges and Universities[f] (thousand 1967 $)
1960	170,780	12,748	158,032					29,303
1961	191,442	14,188	177,254	16,527	0.0448	4,697	0.0245	33,758
1962	222,803	15,376	207,427	18,398	0.0474	5,007	0.0225	38,773
1963	253,778	16,706	237,072	20,862	0.0501	6,321	0.0249	45,093
1964	306,364	18,782	287,582	25,376	0.0544	7,636	0.0249	51,857
1965	318,799	20,949	297,850	28,820	0.0575	8,405	0.0264	56,528
1966	385,599	24,074	361,525	33,728	0.0648	9,174	0.0238	62,714
1967	435,170	25,047	410,123	39,072	0.0700	10,642	0.0245	77,417
1968	499,640	29,883	469,757	48,295	0.0764	12,111	0.0242	93,390
1969	569,587	34,003	535,584	59,040	0.0811	13,640	0.0239	89,304
1970	641,685	36,508	605,177	68,413	0.0864	15,168	0.0236	89,339
1971	694,115	40,356	653,759	76,202	0.0907	16,973	0.0245	94,592
1972	729,736	41,892	687,844	84,203	0.0949	18,778	0.0257	99,827
1973	697,746	44,833	652,913	89,715	0.0973	19,718	0.0283	99,545
1974	737,105	46,961	690,144	94.154	0.0995	21,562	0.0293	95,768
1975	790,250	49,036	741,214	88,085	0.0933	22,746	0.0288	94,585

[a] From U.S. Office of Education (1959-75, 1960-74 annual reports).

[b] Estimated by the formula $U_i = (A_{i+2}/B_{i+2})C_i$, where U_i = behavioral science undergraduate enrollments in year i, A_{i+2} = behavioral sciences baccalaureate degrees awarded in year i + 2, B_{i+2} = total baccalaureate degrees awarded in year i + 2, C_i = total undergraduate enrollments in year i (excluding first professionals). See Appendix D1 for supporting data.

[c] Figures prior to 1975 were from U.S. Office of Education (1948-73, 1961-73 annual reports). The 1975 figure was prepublication data supplied by Mr. Curtis Baker of NCES, Office of Education.

[d] See Appendix D1 for total B.A. degrees.

[e] Figures for 1960-71 were estimated by CHR. Figures for 1972-75 were from NRC (1973, 1975d).

[f] From NSF (1976).

APPENDIX G

DATA RELATING TO THE ANALYSIS OF ACADEMIC DEMAND FOR CLINICAL FACULTY

APP. G1 Medical School Full-time Faculty, Budgeted Full-time Faculty Vacancies, and Student Enrollments, 1961-75

	Full-time Faculty Positions						Student Enrollments			Clin. Relative to		
	Filled Positions			Budgeted Vacancies								
Fiscal Year	Total	Clin. Depts.	Basic Sc. Depts.	Total	Clin. Depts.	Basic Sc. Depts.	Total	Med. Student	Other Med. Equiv.	Total Enroll.	Med. Stu.	Total Fac. Relative to Total Enrollment
1961	11,111	7,108	4,003	784	515	305	63,457	30,288	33,169	0.1120	0.2346	0.1751
1962	12,040	7,698	4,342	836	488	348	65,205	30,836	34,369	0.1181	0.2496	0.1846
1963	13,681	8,965	4,716	826	476	350	66,864	31,491	35,373	0.1341	0.2646	0.2046
1964	14,468	9,632	4,836	915	514	401	69,929	32,001	37,928	0.1377	0.3009	0.2069
1965	15,514	10,381	4,133	955	579	376	72,932	32,428	40,504	0.1423	0.3201	0.2127
1966	17,149	11,489	5,660	1,115	672	443	76,170	32,835	43,335	0.1508	0.3499	0.2251
1967	19,296	13,292	6,004	1,374	854	520	79,625	33,423	46,202	0.1669	0.3977	0.2423
1968	22,163	15,435	6,728	1,585	1,015	570	86,082	34,538	51,544	0.1793	0.4469	0.2575
1969	23,014	16,627	7,098	1,691	1,112	579	91,046	35,833	55,213	0.1826	0.4640	0.2528
1970	24,706	17,183	7,523	1,634	1,093	541	92,678	37,669	55,009	0.1854	0.4562	0.2666
1971	26,504	18,451	8,053	1,490	982	508	98,012	40,487	57,525	0.1882	0.4557	0.2704
1972	29,469	20,902	8,567	1,737	1,241	496	109,984	43,650	66,334	0.1900	0.4788	0.2679
1973	33,550	24,047	9,503	1,846	1,271	575	118,587	47,546	71,041	0.2028	0.5058	0.2829
1974	33,172	23,643	9,529	2,092	1,492	601	119,568	49,808	69,760	0.1977	0.4747	0.2774
1975	36,336	26,280	10,056	2,173	1,564	609	142,238	53,143	89,095	0.1848	0.4945	0.2555

SOURCE: JAMA (1960-75).

APP. G2 Medical School Research and Development Expenditures and Professional Fee Income, 1961-75[a]
(thousands of dollars)

Fiscal Year	R and D in Medical Schools						Professional Fee Income		Price Index (1967 = 100)	
	Current Dollars			1967 Dollars						
	Total	Federal	Nonfed.	Total	Federal	Nonfed.	Current $	1967 $	R & D[b]	Consumer[c]
1961	167,515	118,891	48,624	203,048	144,110	58,938	12,838	14,328	82.5	89.6
1962	206,234	156,667	49,567	242,343	184,098	58,246	15,500	17,108	85.1	90.6
1963	264,418	206,705	57,713	302,192	236,234	65,958	16,681	18,191	87.5	91.7
1964	311,845	252,284	59,561	347,266	280,940	66,326	18,576	19,996	89.8	92.9
1965	342,901	280,562	62,338	369,904	302,656	67,247	21,840	23,111	92.7	94.5
1966	375,116	307,402	67,715	391,153	320,544	70,610	25,203	25,929	95.9	97.2
1967	420,232	344,480	75,751	420,232	344,480	75,751	30,248	30,248	100.0	100.0
1968	473,270	389,609	83,661	451,594	371,764	79,829	48,051	46,114	104.8	104.2
1969	489,314	395,814	93,500	444,831	359,831	85,000	65,304	59,475	110.0	109.8
1970	489,607	381,788	107,819	421,822	329,128	92,947	89,554	77,003	116.0	116.3
1971	480,979	366,006	114,973	392,636	298,780	93,856	115,191	94,964	122.5	121.3
1972	550,859	440,420	110,439	423,412	338,524	84,888	142,041	113,361	130.1	125.3
1973	587,678	472,772	114,906	432,116	347,626	84,490	158,607	119,164	136.0	133.1
1974	624,956	498,310	126,646	433,696	345,808	87,888	200,921	136,033	144.1	147.7
1975	769,352	612,731	156,979	489,721	389,798	99,923	303,028	187,983	157.1	161.2

[a] From JAMA (1960-75).

[b] Figures for 1961-71 were from NSF (1972). Figures for 1972-75 were provided by Dr. Herbert Wooley of NIH.

[c] From U.S. Bureau of the Census (1974b, 1975c).

APPENDIX H

HEALTH SERVICES RESEARCH

APP H1 Employment Status of Health Services Research Personnel Trained through Federal Funds

Training Specialization		Employment Status (%)			
Area	N	Empl. F.T. & P.T.	Postdoc.	Unempl. & Seek Empl.	Other & No Resp.
TOTAL	328	82.9	7.0	1.2	8.8
Behavioral sci.	162	77.2	13.0	1.2	8.6
Biomedical sci.	22	86.4	4.5		9.1
Social sci.	37	83.8		2.7	13.5
Public health	67	89.6	1.5	1.5	7.5
Other res. fields	40	92.5			7.5

SOURCE: NRC, Survey of Health Services Research Personnel, Washington, D.C., 1977.

APP. H2 Type of Employer or Postdoctoral Affiliation for Health Services Research Personnel Trained through Federal Funds

Training Specialization		Type of Employer									
Area	N	Med./Hlth. Professional School	Univ./ Other Ed. Inst.	Fed. Gov.	State/ Local Gov.	Self Empl.	Bus./ Indus.	Hosp. Clinic	Non Profit Org.	Other	No Response
TOTAL	258	35.7	32.9	8.1	7.4	1.6	3.1	2.3	7.0	4	1.6
Behavioral sci.	127	30.7	41.7	6.3	6.3	1.6	2.4	2.4	6.3		2.4
Biomedical sci.	17	64.7	5.9	17.6			5.9		5.9		
Social sci.	28	14.3	57.1	14.3	14.3						
Public health	52	46.2	11.5	7.7	9.6	1.9	5.8	3.8	13.5		
Other res. flds.	34	41.2	26.5	5.9	5.9	2.9	2.9	2.9	5.9	2.9	2.9

SOURCE: National Research Council, Survey of Health Services Research Personnel, 1977.

APP. H3 Percentage of Total Work Time in Health Services Research for Personnel Trained through Federal Funds

Training Specialization		Percent Work Time in Health Services Research						
Area	N	None	1-20	21-40	41-60	61-80	81-100	No Resp.
TOTAL	328	15.2	26.8	15.5	9.1	7.6	18.3	7.3
Behavioral sci.	162	17.3	21.0	16.0	7.4	9.9	21.6	6.8
Biomedical sci.	22	22.7	31.8	13.6	13.6		13.6	4.5
Social sci.	37	24.3	24.3	21.6	5.4	5.4	10.8	8.1
Public health	67	7.5	31.3	16.4	13.4	7.5	13.4	10.4
Other res. fields	40	7.5	42.5	7.5	10.0	5.0	22.5	5.0

SOURCE: NRC, Survey of Health Services Research Personnel, Washington, D.C., 1977.

APP. H4 Primary Research Specialty[a] of Health Services Research Personnel Trained through Federal Funds

Training Specialization		Primary Specialty Area								
Area	N	Facil./ Manpwr.	Serv.	Econ.	Legal/ Qual./ Org. & Util.	Quant.	Syst. Anal. Tech.	Socio./ Comm.	Other	No Response
TOTAL	278	8.3	15.1	10.4	23.7	13.7	3.2	18.0	6.5	1.1
Behavioral sci.	134	9.7	14.2	3.0	20.1	17.2	.7	26.1	7.5	1.5
Biomedical sci.	17		17.6		11.8	29.4	17.6	17.6	5.9	
Social sci.	28		14.3	64.3	14.3		3.6	3.6		
Public health	62	9.7	16.1	4.8	35.5	9.7	3.2	16.1	3.2	1.6
Other res. fields	37	10.8	16.2	10.8	29.7	10.8	5.4	2.7	13.5	

[a] Research specialties represent the following areas: Facil./Manpwr.: health facilities, health manpower; Serv.: ambulatory care, dental health services, emergency health services, health services for the disadvantaged, long term care, nursing health services, pharmacy-related health services; Econ.: economics (including health insurance), inflation, cost containment and production; Legal/Qual./Org. Util.: legal aspects of health care, including regulatory studies, quality assurance of health care services, services organization, planning and administration, utilization of health services; Quant.: evaluation research, health statistics, health status, including indicators development; Syst. Anal. Tech.: systems analysis, health care technology and technology assessment; Socio./Comm.: community studies, sociobehavioral aspects of health care, including compliance.

SOURCE: NRC, Survey of Health Services Research Personnel, Washington, D.C., 1977.

APP. H5 Year of Highest Earned Degree for a Selected Sample of Health Services Research Personnel (Nontrainees)

Field of Training		Year of Degree							
Degree	N	Pre 29	30-39	40-49	50-59	60-69	70-72	73-77	Unknow
TOTAL	782	1.4	6.5	15.9	23.8	31.1	9.2	4.5	7.7
Research deg. total	462	1.3	2.8	10.4	21.4	41.6	13.6	6.9	1.9
Behavioral sci, total	151	.7	1.3	8.6	27.2	39.7	12.6	7.3	2.6
Doctorate	132	.8	.8	8.3	28.0	37.9	13.6	7.6	3.0
Masters	19		5.3	10.5	21.1	52.6	5.3	5.3	
Biomedical sci. total	67	3.0	3.0	13.4	14.9	43.3	19.4	1.5	1.5
Doctorate	57	3.5	3.5	10.5	14.0	45.6	19.3	1.8	1.8
Masters	10			30.0	20.0	30.0	20.0		
Social sci. total	48	2.1		4.2	14.6	41.7	29.2	6.3	2.1
Doctorate	37	2.7		2.7	10.8	45.9	29.7	5.4	2.7
Masters	11			9.1	27.3	27.3	27.3	9.1	
Public health total	97	1.0	4.1	14.4	14.4	47.4	8.2	10.3	
Doctorate	26	3.8	11.5	3.8	15.4	38.5	3.8	23.1	
Masters	71		1.4	18.3	14.1	50.7	9.9	5.6	
Other res. fields total	99	1.0	5.1	10.1	27.3	37.4	9.1	7.1	3.0
Doctorate	62		1.6	3.2	30.6	37.1	12.9	9.7	4.8
Masters	37	2.7	10.8	21.6	21.6	37.8	2.7	2.7	
Professional doctorates	259	1.9	12.0	26.6	30.9	17.4	2.7	.8	7.7
Bachelors and others, NEC	61		11.5	11.5	11.5	9.8	3.3	1.6	50.8

SOURCE: NRC, Survey of Health Services Research Personnel, Washington, D.C., 1977.

APPENDIX I

NURSING RESEARCH

APP. I 1 POPULATION OF NURSES WITH DOCTORATE DEGREES[a]

PHD FIELD/YEAR/SUPPORT		FISCAL TOTAL	YEAR OF 1971	DOCTORATE 1972	1973	1974	1975
TOTAL DOCTORAL NURSES	N	551	104	110	109	94	134
	%	100.0	100.0	100.0	100.0	100.0	100.0
BIOMEDICAL SCIENCE PHD'S	N	65	12	9	16	16	12
	%	11.8	11.5	8.2	14.7	17.0	9.0
BEHAVIORAL SCIENCE PHD'S	N	186	38	41	39	32	36
	%	33.8	36.5	37.3	35.8	34.0	26.9
NURSING SCI DOCTORATES	N	49	5	8	9	10	17
	%	8.9	4.8	7.3	8.3	10.6	12.7
EDUCATION DOCTORATES	N	227	43	46	39	35	64
	%	41.2	41.3	41.8	35.8	37.2	47.8
OTHER DOCTORATES	N	24	6	6	6	1	5
	%	4.4	5.8	5.5	5.5	1.1	3.7
NIH/ADAMHA/HRA PREDOCS	N	222	44	39	55	39	45
	%	40.3	42.3	35.5	50.5	41.5	33.6
OTHER DOCTORAL NURSES	N	329	60	71	54	55	89
	%	59.7	57.7	64.5	49.5	58.5	66.4

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[a] The source for Appendixes I 1 to I 13 is NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976.

APP. I 2 EMPLOYMENT STATUS SINCE EARNING DOCTORATE

	ALL PHD'S		PERCENT OF TIME IN				
PHD FIELD/YEAR/SUPPORT	SURVEY RESP	EST TOTAL	POST DOC	F-T EMPL	P-T EMPL	SEEK EMPL	OTHER STATUS
TOTAL DOCTORAL NURSES	373	551	1.2	91.3	4.8	0.5	2.2
BIOMEDICAL SCIENCE PHD'S	38	65	1.6	88.5	5.3	0.6	4.0
BEHAVIORAL SCIENCE PHD'S	123	186	1.7	90.1	3.9	0.8	2.8
NURSING SCI DOCTORATES	29	49	0.0	89.1	7.9	0.5	2.5
EDUCATION DOCTORATES	169	227	0.7	93.0	5.0	0.2	1.2
OTHER DOCTORATES	14	24	4.6	91.1	0.8	1.8	1.8
FY 1971 PHD'S	69	104	0.5	91.2	4.4	0.6	3.2
FY 1972 PHD'S	78	110	0.7	93.4	4.4	0.2	1.3
FY 1973 PHD'S	73	109	2.9	90.1	5.5	0.6	1.1
FY 1974 PHD'S	59	94	0.3	90.7	4.9	0.7	3.5
FY 1975 PHD'S	94	134	1.5	91.2	4.6	0.5	2.2
NIH/ADAMHA/HRA PREDOCS	144	222	1.7	90.0	4.9	0.5	3.0
OTHER DOCTORAL NURSES	229	329	0.9	92.2	4.7	0.5	1.7

APP. I 3 CURRENT (OCTOBER 1976) EMPLOYMENT STATUS

PHD FIELD/YEAR/SUPPORT	ALL PHD'S SURVEY RESP	ALL PHD'S EST TOTAL	PERCENT CURRENTLY IN POST DOC	PERCENT CURRENTLY IN F-T EMPL	PERCENT CURRENTLY IN P-T EMPL	PERCENT CURRENTLY IN SEEK EMPL	PERCENT CURRENTLY IN OTHER STATUS
TOTAL DOCTORAL NURSES	382	551		94.9	2.4	1.5	1.3
BIOMEDICAL SCIENCE PHD'S	39	65		93.8	3.1		3.1
BEHAVIORAL SCIENCE PHD'S	127	186		93.5	4.3	1.6	.5
NURSING SCI DOCTORATES	29	49		95.9	4.1		
EDUCATION DOCTORATES	171	227		97.4	.4	.4	1.8
OTHER DOCTORATES	16	24		83.3		16.7	
FY 1971 PHD'S	73	104		92.3	1.9		5.8
FY 1972 PHD'S	80	110		92.7	7.3		
FY 1973 PHD'S	75	109		98.2		1.8	
FY 1974 PHD'S	59	94		95.7	3.2		1.1
FY 1975 PHD'S	95	134		95.5		4.5	
NIH/ADAMHA/HRA PREDOCS	146	222		95.0	1.8	.9	2.3
OTHER DOCTORAL NURSES	236	329		94.8	2.7	1.8	.6

P. I 4   SECTOR OF EMPLOYMENT

PERCENT EMPLOYED OR ON POSTDOCTORAL APPOINTMENTS IN

	ALL EMPLOYED		**EDUCATIONAL INSTITUTION**					***GOVERNMENT***			****BUSINESS****			**OTHER SECTORS**		
HD FIELD/YEAR/SUPPORT	SURVEY RESP	EST TOTAL	TOTAL	UNIV/ COLL	MED SCHL	PROF SCHL	OTHER EDUC	TOTAL	FEDL GOVT	OTHER GOVT	TOTAL	SELF EMPL	OTHER BUSN	TOTAL	HOSP/ CLNIC	OTHER TYPE
OTAL DOCTORAL NURSES	367	536	90.9	38.8	5.5	42.8	3.8	3.0	1.3	1.7	1.5	1.3	.2	4.5	2.3	2.3
IOMEDICAL SCIENCE PHD'S	38	63	93.7	30.2	14.3	49.2		6.3	3.2	3.2						
EHAVIORAL SCIENCE PHD'S	121	182	92.7	38.2	5.1	47.2	2.2	2.2	1.7	.6	1.1	1.1		3.9	.6	3.4
URSING SCI DOCTORATES	28	49	83.0	27.7	14.9	40.4		8.5		8.5				8.5	4.3	4.3
DUCATION DOCTORATES	167	222	90.5	45.0	1.8	36.5	7.2	1.8	.9	.9	2.3	2.3		5.4	3.6	1.8
THER DOCTORATES	13	20	88.9	27.8		61.1					5.6		5.6	5.6	5.6	
Y 1971 PHD'S	67	98	87.5	32.3	3.1	46.9	5.2	5.2	3.1	2.1	4.2	4.2		3.1	1.0	2.1
Y 1972 PHD'S	78	110	90.6	33.0	7.5	48.1	1.9	1.9		1.9	2.8	1.9	.9	4.7	2.8	1.9
Y 1973 PHD'S	74	107	96.3	37.4	3.7	51.4	3.7							3.7	2.8	.9
Y 1974 PHD'S	58	93	89.2	37.6	7.5	38.7	5.4	5.4	1.1	4.3	1.1	1.1		4.3		4.3
Y 1975 PHD'S	90	128	90.5	50.8	5.6	31.0	3.2	3.2	2.4	.8				6.3	4.0	2.4
IH/ADAMHA/HRA PREDOCS	140	215	89.6	38.2	8.0	42.5	.9	3.3	1.9	1.4	2.4	2.4		4.7	2.8	1.9
THER DOCTORAL NURSES	227	321	91.8	39.2	3.8	43.0	5.7	2.8	.9	1.9	.9	.6	.3	4.4	1.9	2.5

APP. I 5 TIME SPENT ON RESEARCH AND OTHER WORK ACTIVITIES

PHD FIELD/YEAR/SUPPORT	ALL EMPLOYED SURVEY RESP	ALL EMPLOYED EST TOTAL	PERCENT OF TIME SPENT IN R&D	TEACH	MGMT/ ADMIN	CON SULT	OTHER PROF SERV	OTHER ACTIVITY	PERCENT WITH SOME TIME IN RESEARCH
TOTAL DOCTORAL NURSES	362	536	13.2	42.5	30.7	5.8	5.5	2.3	75.6
BIOMEDICAL SCIENCE PHD'S	37	63	17.8	48.3	24.4	4.8	2.9	1.9	70.5
BEHAVIORAL SCIENCE PHD'S	121	182	14.2	45.2	26.3	6.4	6.3	1.6	82.0
NURSING SCI DOCTORATES	27	49	19.4	43.9	19.4	5.3	12.0	0.0	77.8
EDUCATION DOCTORATES	165	222	10.1	39.3	38.0	5.6	4.4	2.7	71.4
OTHER DOCTORATES	12	20	10.9	30.9	35.3	6.8	5.0	11.2	76.5
FY 1971 PHD'S	65	98	13.3	35.2	35.5	7.3	6.7	2.1	80.6
FY 1972 PHD'S	77	110	11.3	40.9	30.0	7.1	7.7	3.1	70.5
FY 1973 PHD'S	74	107	14.2	50.1	27.3	3.9	3.4	1.1	70.1
FY 1974 PHD'S	57	93	14.8	43.3	28.9	4.6	6.6	1.7	80.2
FY 1975 PHD'S	89	128	12.8	42.1	30.0	6.1	3.9	3.1	77.6
NIH/ADAMHA/HRA PREDOCS	139	215	15.5	44.1	25.7	6.6	6.0	2.1	79.5
OTHER DOCTORAL NURSES	223	321	11.6	41.4	34.1	5.3	5.3	2.4	73.0

APP. I 6 ORIENTATION, HEALTH RELATEDNESS, AND SUPPORT/SPONSORSHIP OF RESEARCH

	RESEARCHERS		PERCENT ENGAGED IN RESEARCH CHARACTERIZED AS											
			ORIENTED		**RELATED TO HEALTH**			***SUPPORTED OR SPONSORED BY***					
PHD FIELD/YEAR/SUPPORT	SURVEY RESP	EST TOTAL	CLINIC ALLY	OTHER	DIR ECTLY	INDIR ECTLY	NOT AT ALL	NON FEDL	TOTAL FEDL	NIH	ADAMHA	HRA	OTHER FEDL
TOTAL DOCTORAL NURSES	268	394	71.7	28.3	77.7	21.7	.6	67.2	32.8	14.6	2.7	9.4	10.3
BIOMEDICAL SCIENCE PHD'S	26	43	62.5	37.5	92.5	7.5		66.7	33.3	17.9		12.8	7.7
BEHAVIORAL SCIENCE PHD'S	98	146	73.9	26.1	78.4	21.6		54.1	45.9	21.3	3.3	15.6	11.5
NURSING SCI DOCTORATES	20	35	68.8	31.3	68.8	28.1	3.1	50.0	50.0	15.4	3.8	7.7	23.1
EDUCATION DOCTORATES	115	157	71.5	28.5	73.5	25.8	.8	84.3	15.7	6.7	1.5	1.5	6.7
OTHER DOCTORATES	9	13	100.0		100.0			37.5	62.5	25.0	25.0	37.5	25.0
FY 1971 PHD'S	51	75	75.4	24.6	78.3	20.0	1.7	63.9	36.1	9.8	13.1	18.0	3.3
FY 1972 PHD'S	53	74	77.4	22.6	77.8	22.2		62.9	37.1	14.5	1.6	14.5	16.1
FY 1973 PHD'S	48	75	58.2	41.8	86.6	13.4		59.7	40.3	21.0		11.3	9.7
FY 1974 PHD'S	45	73	72.7	27.3	76.1	23.9		73.0	27.0	15.9		3.2	9.5
FY 1975 PHD'S	71	97	75.3	24.7	71.3	27.5	1.3	74.1	25.9	12.3		2.5	12.3
NIH/ADAMHA/HRA PREDOCS	109	167	70.3	29.7	78.2	21.1	.7	59.0	41.0	18.0	4.3	15.8	7.2
OTHER DOCTORAL NURSES	159	227	72.8	27.2	77.4	22.1	.5	73.2	26.8	12.1	1.6	4.7	12.6

APP. I 7   IMPORTANCE OF DOCTORATE AS CREDENTIAL FOR ATTAINING PRESENT POSITION

PHD FIELD/YEAR/SUPPORT	F-T EMPLOYED SURVEY RESP	F-T EMPLOYED EST TOTAL	PERCENT WHO CONSIDER DEGREE ESSENTIAL	PERCENT WHO CONSIDER DEGREE HELPFUL	PERCENT WHO CONSIDER DEGREE NOT NEEDED	PERCENT WHO CONSIDER DEGREE UNCERTAIN
TOTAL DOCTORAL NURSES	362	523	70.2	26.2	2.9	.8
BIOMEDICAL SCIENCE PHD'S	37	61	83.6	16.4		
BEHAVIORAL SCIENCE PHD'S	119	174	69.5	27.6	2.9	
NURSING SCI DOCTORATES	27	47	62.2	33.3	4.4	
EDUCATION DOCTORATES	166	221	67.9	26.7	3.6	1.8
OTHER DOCTORATES	13	20	78.9	21.1		
FY 1971 PHD'S	67	96	81.3	13.5	5.2	
FY 1972 PHD'S	74	102	73.7	23.2	1.0	2.0
FY 1973 PHD'S	74	107	64.5	35.5		
FY 1974 PHD'S	56	90	67.8	27.8	4.4	
FY 1975 PHD'S	91	128	65.6	28.9	3.9	1.6
NIH/ADAMHA/HRA PREDOCS	138	211	74.6	23.9	1.4	
OTHER DOCTORAL NURSES	224	312	67.2	27.7	3.9	1.3

APP. I 8 MINIMUM LEVEL OF TRAINING NEEDED TO FULFILL PRESENT JOB REQUIREMENTS

	F-T EMPLOYED		PERCENT WHO CONSIDER LEVEL NEEDED				
PHD FIELD/YEAR/SUPPORT	SURVEY RESP	EST TOTAL	POST DOC	MD/ PHD	MS/MA	BS/BA	OTHER
TOTAL DOCTORAL NURSES	362	523	1.9	65.2	31.5	.2	1.2
BIOMEDICAL SCIENCE PHD'S	37	61	3.3	73.8	23.0		
BEHAVIORAL SCIENCE PHD'S	119	174	3.4	60.9	33.9	.6	1.1
NURSING SCI DOCTORATES	27	47		66.7	24.4		8.9
EDUCATION DOCTORATES	166	221	.9	64.7	34.4		
OTHER DOCTORATES	13	20		78.9	21.1		
FY 1971 PHD'S	67	96	5.2	75.0	17.7		2.1
FY 1972 PHD'S	74	102	2.0	69.7	27.3	1.0	
FY 1973 PHD'S	74	107	1.9	59.8	38.3		
FY 1974 PHD'S	56	90	1.1	60.0	38.9		
FY 1975 PHD'[illegible]	91	128		62.5	34.4		3.1
NIH/ADAMHA/HRA PREDOCS	138	211	2.4	69.9	27.8		
OTHER DOCTORAL NURSES	224	312	1.6	62.1	34.1	.3	1.9

APP. I 9 IMPORTANCE OF PREDOCTORAL RESEARCH EXPERIENCE TO PRESENT POSITION

PHD FIELD/YEAR/SUPPORT	F-T EMPLOYED SURVEY RESP	F-T EMPLOYED EST TOTAL	PERCENT WHO CONSIDER EXPERIENCE ESSENTIAL	USEFUL	NOT USEFL	UNCERTAIN
TOTAL DOCTORAL NURSES	355	523	54.3	40.6	2.4	2.8
BIOMEDICAL SCIENCE PHD'S	37	61	63.9	32.8		3.3
BEHAVIORAL SCIENCE PHD'S	116	174	63.7	31.0	2.4	3.0
NURSING SCI DOCTORATES	26	47	62.8	23.3	9.3	4.7
EDUCATION DOCTORATES	163	221	42.9	53.9	1.8	1.4
OTHER DOCTORATES	13	20	52.6	36.8		10.5
FY 1971 PHD'S	66	96	62.8	30.9	4.3	2.1
FY 1972 PHD'S	73	102	54.6	38.1	4.1	3.1
FY 1973 PHD'S	73	107	57.5	37.7	1.9	2.8
FY 1974 PHD'S	55	90	45.5	51.1	1.1	2.3
FY 1975 PHD'S	88	128	51.2	44.7	.8	3.3
NIH/ADAMHA/HRA PREDOCS	136	211	60.5	37.1	2.4	
OTHER DOCTORAL NURSES	219	312	50.2	42.9	2.3	4.6

APP. I 10 OVERALL RELEVANCE OF DOCTORAL DEGREE, TRAINING, AND RESEARCH EXPERIENCE TO PRESENT EMPLOYMENT SITUATION

	LABOR FORCE		PERCENT WHO CONSIDER PHD		
PHD FIELD/YEAR/SUPPORT	SURVEY RESP	EST TOTAL	ESSENTIAL	USEFUL	NOT USED
TOTAL DOCTORAL NURSES	375	544	77.3	19.4	3.3
BIOMEDICAL SCIENCE PHD'S	38	63	88.9	11.1	
BEHAVIORAL SCIENCE PHD'S	126	185	77.3	18.4	4.3
NURSING SCI DOCTORATES	28	49	76.6	14.9	8.5
EDUCATION DOCTORATES	168	223	75.3	23.8	.9
OTHER DOCTORATES	15	24	65.2	17.4	17.4
FY 1971 PHD'S	69	98	88.8	8.2	3.1
FY 1972 PHD'S	78	110	79.4	18.7	1.9
FY 1973 PHD'S	75	109	76.1	22.0	1.8
FY 1974 PHD'S	58	93	74.2	23.7	2.2
FY 1975 PHD'S	95	134	70.1	23.1	6.7
NIH/ADAMHA/HRA PREDOCS	142	217	82.8	15.8	1.4
OTHER DOCTORAL NURSES	233	327	73.6	21.8	4.6

APP. I 11.1 PRIMARY SOURCES OF SUPPORT IN FIRST AND SECOND YEARS OF GRADUATE SCHOOL

	ALL PHD'S		PERCENT SUPPORTED IN FIRST YEAR BY						PERCENT SUPPORTED IN SECOND YEAR BY					
			--TRG/FELL--		FEDL	UNIV			--TRG/FELL--		FEDL	UNIV		
PHD FIELD/YEAR/SUPPORT	SURVEY RESP	EST TOTAL	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKNOWN	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKNOWN
TOTAL DOCTORAL NURSES	374	551	33.0	25.0	5.4	6.7	27.1	2.8	31.4	24.0	4.3	7.9	29.2	3.1
BIOMEDICAL SCIENCE PHD'S	39	65	46.2	12.3	6.2	15.4	20.0		46.2	18.5	6.2	15.4	13.8	
BEHAVIORAL SCIENCE PHD'S	125	186	40.1	24.7	6.0	6.0	20.3	2.7	40.3	25.4	5.5	5.5	22.1	1.1
NURSING SCI DOCTORATES	29	49	49.0	18.4	12.2	4.1	12.2	4.1	49.0	24.5	12.2	14.3		
EDUCATION DOCTORATES	169	227	19.6	31.3	3.6	5.8	36.2	3.6	17.6	23.8	1.3	5.7	44.9	6.6
OTHER DOCTORATES	12	24	36.8	15.8			47.4		15.8	31.6		15.8	36.8	
FY 1971 PHD'S	71	104	34.7	21.8	5.9	7.9	26.7	3.0	34.7	24.8	5.0	9.9	24.8	1.0
FY 1972 PHD'S	78	110	30.6	28.7	6.5	5.6	26.9	1.9	29.6	29.6	4.6	5.6	28.7	1.9
FY 1973 PHD'S	75	109	45.0	22.0	1.8	7.3	22.9	.9	37.6	27.5	1.8	6.4	24.8	1.8
FY 1974 PHD'S	58	94	29.3	21.7	13.0	5.4	27.2	3.3	29.3	16.3	10.9	7.6	31.5	4.3
FY 1975 PHD'S	92	134	26.4	29.5	1.6	7.0	31.0	4.7	26.7	21.4	.8	9.9	35.1	6.1
NIH/ADAMHA/HRA PREDOCS	144	222	81.3	3.2	1.8	1.8	10.5	1.4	76.6	3.6		2.3	16.2	1.4
OTHER DOCTORAL NURSES	230	329		40.0	7.8	10.0	38.4	3.8		38.2	7.2	11.9	38.2	4.4

APP. I 11.2 PRIMARY SOURCES OF SUPPORT IN THIRD AND FOURTH YEARS OF GRADUATE SCHOOL

	ALL PHD'S		PERCENT SUPPORTED IN THIRD YEAR BY						PERCENT SUPPORTED IN FOURTH YEAR BY					
			--TRG/FELL--		FEDL	UNIV			--TRG/FELL--		FEDL	UNIV		
PHD FIELD/YEAR/SUPPORT	SURVEY RESP	EST TOTAL	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKN	NIH/ ADAMHA	OTHER FEDL	RES GRANT	OR STATE	PER SONAL	OTHER/ UNKN
TOTAL DOCTORAL NURSES	362	551	27.7	17.4	3.6	12.8	33.5	5.0	24.5	16.6	5.5	8.0	40.5	5.0
BIOMEDICAL SCIENCE PHD'S	38	65	47.6	15.9	3.2	15.9	17.5		34.5	16.4	7.3	12.7	27.3	1.8
BEHAVIORAL SCIENCE PHD'S	120	186	38.3	18.9	5.1	10.3	24.6	2.9	32.9	22.8	6.0	7.4	27.5	3.4
NURSING SCI DOCTORATES	29	49	34.7	16.3	8.2	20.4	20.4		32.6	11.6	9.3	9.3	37.2	
EDUCATION DOCTORATES	163	227	13.8	17.5	1.8	10.6	46.5	9.7	13.5	14.0	2.8	6.2	54.5	9.0
OTHER DOCTORATES	12	24	5.3	10.5		31.6	52.6		13.3		13.3	13.3	60.0	
FY 1971 PHD'S	68	104	27.6	10.2	5.1	16.3	31.6	9.2	22.4	9.2	3.9	10.5	43.4	10.5
FY 1972 PHD'S	76	110	28.6	30.5	3.8	6.7	27.6	2.9	26.1	21.7	6.5	5.4	37.0	3.3
FY 1973 PHD'S	72	109	31.1	21.4	1.9	15.5	26.2	3.9	25.6	27.9	5.8	9.3	29.1	2.3
FY 1974 PHD'S	55	94	26.1	8.0	8.0	19.3	36.4	2.3	20.0	11.4	[illegible]	10.0	45.7	2.9
FY 1975 PHD'S	91	134	25.6	15.5	.8	8.5	43.4	6.2	26.7	12.1	2.6	6.0	46.6	6.0
NIH/ADAMHA/HRA PREDOCS	143	222	66.8	3.2		8.3	18.0	3.7	60.0	5.0	1.7	3.3	25.6	4.4
OTHER DOCTORAL NURSES	219	329		27.5	6.2	16.0	44.4	5.9		24.6	8.1	11.2	50.8	5.4

APP. I 12 DEPENDENCE ON FEDERAL SUPPORT TO COMPLETE PHD PROGRAM

	RECEIVED SOME FEDL SUPPORT		PERCENT WHO WITHOUT SUPPORT FELT THEY COULD		
PHD FIELD/YEAR/SUPPORT	SURVEY RESP	EST TOTAL	EARN PHD	NOT EARN PHD	UNCER TAIN
TOTAL DOCTORAL NURSES	288	424	15.1	59.9	25.0
BIOMEDICAL SCIENCE PHD'S	29	51	3.9	64.7	31.4
BEHAVIORAL SCIENCE PHD'S	104	153	7.2	67.3	25.5
NURSING SCI DOCTORATES	26	43	9.3	72.1	18.6
EDUCATION DOCTORATES	120	164	26.2	48.8	25.0
OTHER DOCTORATES	9	13	30.8	53.8	15.4
FY 1971 PHD'S	54	77	10.4	55.8	33.8
FY 1972 PHD'S	61	86	23.3	47.7	29.1
FY 1973 PHD'S	62	90	14.4	66.7	18.9
FY 1974 PHD'S	47	76	13.2	63.2	23.7
FY 1975 PHD'S	64	95	13.7	65.3	21.1
NIH/ADAMHA/HRA PREDOCS	143	218	9.2	70.2	20.6
OTHER DOCTORAL NURSES	145	206	21.4	49.0	29.6

APP. I 13 INFLUENCE OF THE AVAILABILITY OF FINANCIAL ASSISTANCE ON THE SELECTION OF A PH.D. PROGRAM

	ALL PHD'S		PERCENT INDICATING AVAILABILITY HAD		
PHD FIELD/YEAR/SUPPORT	SURVEY RESP	EST TOTAL	SOME EFFECT	NO EFFCT	UNCERTAIN
TOTAL DOCTORAL NURSES	360	551	29.5	67.4	3.1
BIOMEDICAL SCIENCE PHD'S	38	65	42.2	57.8	
BEHAVIORAL SCIENCE PHD'S	121	186	29.2	66.3	4.5
NURSING SCI DOCTORATES	29	49	24.5	69.4	6.1
EDUCATION DOCTORATES	161	227	26.2	71.5	2.3
OTHER DOCTORATES	11	24	41.2	58.8	
FY 1971 PHD'S	67	104	32.3	64.6	3.1
FY 1972 PHD'S	77	110	28.0	66.4	5.6
FY 1973 PHD'S	73	109	30.2	68.9	.9
FY 1974 PHD'S	58	94	25.0	70.7	4.3
FY 1975 PHD'S	85	134	31.4	66.9	1.7
NIH/ADAMHA/HRA PREDOCS	146	222	32.9	62.6	4.5
OTHER DOCTORAL NURSES	214	329	27.0	71.0	2.0

APPENDIX J

MINORITIES AND WOMEN

APP. J1 ANNUAL DOCTORATES AWARDED IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES BY SEX AND RACIAL GROUP, 1973-76[a]

	BIOMEDICAL PHD'S				BEHAVIORAL PHD'S			
SEX AND RACIAL GROUP	1973	1974	1975	1976	1973	1974	1975	1976
BOTH SEXES	3273	3195	3286	3371	3374	3576	3698	3971
US NATIVE BORN WHITES	1926	2206	2464	2506	2260	2830	3029	3291
US NATIVE BORN MINORITIES	103	118	107	110	92	119	173	205
BLACKS	47	58	45	50	45	74	105	131
AMERICAN INDIANS	8	13	9	12	16	12	16	23
CHICANOS	12	8	20	13	10	13	26	21
PUERTO RICANS	6	6	5	5	6	5	12	13
ASIANS	30	33	28	30	15	15	14	17
OTHER US NATIVE BORN	714	299	174	204	748	354	150	170
FOREIGN BORN	530	572	541	551	274	273	306	305
MALES	2574	2464	2482	2584	2394	2467	2482	2646
US NATIVE BORN WHITES	1500	1693	1859	1934	1607	1956	2041	2191
US NATIVE BORN MINORITIES	77	97	77	77	72	72	113	133
BLACKS	35	42	32	27	36	45	63	77
AMERICAN INDIANS	5	12	4	10	12	10	12	16
CHICANOS	9	8	18	13	9	8	21	20
PUERTO RICANS	4	6	4	4	4	3	9	9
ASIANS	24	29	19	23	11	6	8	11
OTHER US NATIVE BORN	591	234	140	170	531	260	138	136
FOREIGN BORN	406	440	406	403	184	179	190	186
FEMALES	699	731	804	787	980	1109	1216	1325
US NATIVE BORN WHITES	426	513	605	572	653	874	988	1100
US NATIVE BORN MINORITIES	26	21	30	33	20	47	60	72
BLACKS	12	16	13	23	9	29	42	54
AMERICAN INDIANS	3	1	5	2	4	2	4	7
CHICANOS	3		2		1	5	5	1
PUERTO RICANS	2		1	1	2	2	3	4
ASIANS	6	4	9	7	4	9	6	6
OTHER US NATIVE BORN	123	65	34	34	217	94	52	34
FOREIGN BORN	124	132	135	148	90	94	116	119

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[a] The source for Appendixes J1-J9 is NRC, Survey of Earned Doctorates, Washington, D.C., 1973-76.

APP. J2 GRADUATE TRAINING FIELD OF 1973-76 DOCTORATE RECIPIENTS WITH BACCALAUREATE DEGREES IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES

	1973-76 PHD'S W/ BIOMED BA		PERCENT WITH				1973-76 PHD'S W/ BEHAV BA		PERCENT WITH			
SEX AND RACIAL GROUP	SURVEY RESP	TOTAL	BIOMED PHD	OTHER SCI PHD	EDUC DOCT	HUMAN & OTHER DOCT	SURVEY RESP	TOTAL	BEHAV PHD	OTHER SCI PHD	EDUC DOCT	HUMAN & OTHER DOCT
BOTH SEXES	11366	11368	66.2	19.5	12.6	1.8	13874	13874	69.9	4.7	20.6	4.8
US NATIVE BORN WHITES	8610	8611	65.5	20.4	12.3	1.8	11138	11138	70.7	4.6	20.3	4.4
US NATIVE BORN MINORITIES	564	564	53.4	13.1	31.7	1.8	727	727	52.5	4.5	35.5	7.4
BLACKS	334	334	43.7	9.6	44.3	2.4	482	482	47.5	5.2	39.0	8.3
AMERICAN INDIANS	40	40	50.0	30.0	20.0		64	64	64.1	3.1	31.3	1.6
CHICANOS	57	57	63.2	12.3	24.6		82	82	57.3	1.2	34.1	7.3
PUERTO RICANS	26	26	57.7	23.1	15.4	3.8	31	31	74.2		19.4	6.5
ASIANS	107	107	78.5	15.9	4.7	.9	68	68	61.8	7.4	23.5	7.4
OTHER US NATIVE BORN	855	855	65.6	18.9	13.8	1.6	1053	1053	69.6	4.6	19.9	5.9
FOREIGN BORN	1337	1338	76.8	16.2	5.3	1.6	956	956	74.4	5.8	13.4	6.5
MALES	8291	8293	67.6	20.8	10.2	1.5	9736	9736	69.3	5.2	20.6	5.0
US NATIVE BORN WHITES	6278	6279	66.7	21.9	9.8	1.6	7830	7830	70.0	5.0	20.3	4.7
US NATIVE BORN MINORITIES	398	398	55.5	13.8	29.9	.8	496	496	51.8	5.2	36.1	6.9
BLACKS	218	218	45.0	8.3	45.9	.9	306	306	45.4	6.2	40.5	7.8
AMERICAN INDIANS	30	30	46.7	36.7	16.7		53	53	62.3	3.8	32.1	1.9
CHICANOS	49	49	65.3	12.2	22.4		67	67	59.7	1.5	34.3	4.5
PUERTO RICANS	19	19	68.4	31.6			21	21	71.4		19.0	9.5
ASIANS	82	82	78.0	17.1	3.7	1.2	49	49	61.2	8.2	22.4	8.2
OTHER US NATIVE BORN	663	663	67.9	19.2	11.5	1.5	798	798	68.7	5.3	19.8	6.3
FOREIGN BORN	952	953	77.9	17.3	3.6	1.2	612	612	74.7	7.2	12.6	5.6
FEMALES	3075	3075	62.6	15.9	19.0	2.5	4138	4138	71.4	3.5	20.7	4.5
US NATIVE BORN WHITES	2332	2332	62.1	16.4	19.1	2.4	3308	3308	72.2	3.6	20.4	3.8
US NATIVE BORN MINORITIES	166	166	48.2	11.4	36.1	4.2	231	231	54.1	3.0	34.2	8.7
BLACKS	116	116	41.4	12.1	41.4	5.2	176	176	51.1	3.4	36.4	9.1
AMERICAN INDIANS	10	10	60.0	10.0	30.0		11	11	72.7		27.3	
CHICANOS	8	8	50.0	12.5	37.5		15	15	46.7		33.3	20.0
PUERTO RICANS	7	7	28.6		57.1	14.3	10	10	80.0		20.0	
ASIANS	25	25	80.0	12.0	8.0		19	19	63.2	5.3	26.3	5.3
OTHER US NATIVE BORN	192	192	57.8	18.2	21.9	2.1	255	255	72.5	2.4	20.4	4.7
FOREIGN BORN	385	385	74.0	13.5	9.6	2.9	344	344	73.8	3.2	14.8	8.1

APP. J3 AGE AT COMPLETION OF DOCTORAL PROGRAM IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES, 1973-76

	TOTAL 1973-76 BIOMED PHD'S		PERCENT WITH AGE			TOTAL 1973-76 BEHAV PHD'S		PERCENT WITH AGE		
SEX AND RACIAL GROUP	SURVEY RESP	TOTAL	UNDER 30 YRS	30-39 YRS	40 YRS OR MORE	SURVEY RESP	TOTAL	UNDER 30 YRS	30-39 YRS	40 YRS OR MORE
BOTH SEXES	12770	13125	43.8	49.4	6.8	14388	14619	39.1	49.1	11.8
US NATIVE BORN WHITES	9100	9102	47.5	46.3	6.2	11401	11410	40.4	48.5	11.1
US NATIVE BORN MINORITIES	436	438	36.7	50.7	12.6	589	589	33.3	49.1	17.7
BLACKS	199	200	26.1	[illegible]	20.6	355	355	33.0	47.6	19.4
AMERICAN INDIANS	42	42	45.2	42.9	11.9	67	67	28.4	52.2	19.4
CHICANOS	53	53	35.8	58.5	5.7	70	70	37.1	45.7	17.1
PUERTO RICANS	22	22	27.3	72.7		36	36	38.9	50.0	11.1
ASIANS	120	121	53.3	41.7	5.0	61	61	32.8	57.4	9.8
OTHER US NATIVE BORN	1045	1391	43.8	50.0	6.2	1243	1462	39.0	50.6	10.4
FOREIGN BORN	2189	2194	29.9	61.8	8.4	1155	1158	29.7	53.2	17.1
MALES	9821	10104	43.0	51.6	5.3	9825	9989	39.2	51.6	9.2
US NATIVE BORN WHITES	6585	6986	47.1	48.3	4.5	7788	7795	40.6	51.0	8.4
US NATIVE BORN MINORITIES	328	328	34.5	53.7	11.9	390	390	30.3	54.4	15.4
BLACKS	136	136	21.3	57.4	21.3	221	221	28.5	53.8	17.6
AMERICAN INDIANS	31	31	48.4	38.7	12.9	50	50	30.0	60.0	10.0
CHICANOS	48	48	33.3	62.5	4.2	58	58	41.4	41.4	17.2
PUERTO RICANS	18	18	27.8	72.2		25	25	32.0	60.0	8.0
ASIANS	95	95	50.5	45.3	4.2	36	36	22.2	66.7	11.1
OTHER US NATIVE BORN	855	1135	44.0	51.2	4.8	909	1065	39.2	52.0	8.8
FOREIGN BORN	1653	1655	26.8	65.4	7.8	738	739	29.1	56.5	14.4
FEMALES	2949	3021	46.6	41.8	11.6	4563	4630	39.0	43.7	17.3
US NATIVE BORN WHITES	2115	2116	48.9	39.4	11.7	3613	3615	40.0	43.2	16.8
US NATIVE BORN MINORITIES	108	110	43.5	41.7	14.8	199	199	39.2	38.7	22.1
BLACKS	63	64	36.5	44.4	19.0	134	134	40.3	37.3	22.4
AMERICAN INDIANS	11	11	36.4	54.5	9.1	17	17	23.5	29.4	47.1
CHICANOS	5	5	60.0	20.0	20.0	12	12	16.7	66.7	16.7
PUERTO RICANS	4	4	25.0	75.0		11	11	54.5	27.3	18.2
ASIANS	25	26	64.0	28.0	8.0	25	25	48.0	44.0	8.0
OTHER US NATIVE BORN	190	256	43.2	44.2	12.6	334	397	38.6	46.7	14.7
FOREIGN BORN	536	539	39.4	50.6	10.1	417	419	30.7	47.5	21.8

APP. J4 AGE AT ENTRANCE TO GRADUATE SCHOOL OF BIOMEDICAL AND BEHAVIORAL DOCTORATE RECIPIENTS, 1973-76

	TOTAL 1973-76 BIOMED PHD'S		PERCENT WITH AGE AT GRAD ENTRANCE			TOTAL 1973-76 BEHAV PHD'S		PERCENT WITH AGE AT GRAD ENTRANCE		
SEX AND RACIAL GROUP	SURVEY RESP	TOTAL	UNDER 25 YRS	25-34 YRS	35 YRS OR MORE	SURVEY RESP	TOTAL	UNDER 25 YRS	25-34 YRS	35 YRS OR MORE
BOTH SEXES	12046	13125	77.4	21.3	1.4	13844	14619	75.3	21.5	3.2
US NATIVE BORN WHITES	8802	9102	80.7	18.0	1.3	11159	11410	77.0	19.9	3.1
US NATIVE BORN MINORITIES	420	438	69.5	27.9	2.6	572	589	64.3	32.2	3.5
BLACKS	191	200	60.2	36.6	3.1	342	355	62.6	33.6	3.8
AMERICAN INDIANS	42	42	83.3	11.9	4.8	67	67	58.2	35.8	6.0
CHICANOS	50	53	68.0	30.0	2.0	67	70	64.2	31.3	4.5
PUERTO RICANS	21	22	76.2	23.8		36	36	77.8	22.2	
ASIANS	116	121	79.3	19.0	1.7	60	61	73.3	26.7	
OTHER US NATIVE BORN	897	1391	80.2	18.8	1.0	1043	1402	76.1	22.2	1.6
FOREIGN BORN	1927	2194	62.4	36.1	1.5	1070	1158	62.5	31.8	5.7
MALES	9233	10104	77.1	22.1	.8	9471	9989	75.8	22.4	1.8
US NATIVE BORN WHITES	6736	6986	81.1	18.2	.7	7645	7795	77.8	20.5	1.7
US NATIVE BORN MINORITIES	315	328	68.9	28.9	2.2	379	390	59.4	37.5	3.2
BLACKS	129	136	58.1	39.5	2.3	213	221	54.5	41.3	4.2
AMERICAN INDIANS	31	31	83.9	9.7	6.5	50	50	60.0	38.0	2.0
CHICANOS	46	48	65.2	32.6	2.2	56	58	69.6	26.8	3.6
PUERTO RICANS	17	18	82.4	17.6		25	25	72.0	28.0	
ASIANS	92	95	78.3	20.7	1.1	35	36	62.9	37.1	
OTHER US NATIVE BORN	743	1135	80.9	18.6	.5	762	1065	76.8	22.2	1.0
FOREIGN BORN	1439	1655	58.4	40.6	1.0	685	739	61.2	35.5	3.4
FEMALES	2813	3021	78.1	18.7	3.2	4373	[illegible]	74.3	19.5	6.2
US NATIVE BORN WHITES	2066	2116	79.4	17.2	3.3	3514	3615	75.3	18.6	6.1
US NATIVE BORN MINORITIES	105	110	71.4	24.8	3.8	193	199	74.1	21.8	4.1
BLACKS	62	64	64.5	30.6	4.8	129	134	76.0	20.9	3.1
AMERICAN INDIANS	11	11	81.8	18.2		17	17	52.9	29.4	17.6
CHICANOS	4	5	100.0			11	12	36.4	54.5	9.1
PUERTO RICANS	4	4	50.0	50.0		11	11	90.9	9.1	
ASIANS	24	26	83.3	12.5	4.2	25	25	88.0	12.0	
OTHER US NATIVE BORN	154	256	76.6	20.1	3.2	281	397	74.4	22.4	3.2
FOREIGN BORN	488	539	74.4	23.0	2.7	385	419	64.9	25.2	9.9

APP. J5 YEARS NOT ENROLLED DURING PERIOD BETWEEN BEGINNING AND COMPLETION OF GRADUATE TRAINING IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES, 1973-76

SEX AND RACIAL GROUP	TOTAL 1973-76 BIOMED PHD'S		PERCENT WITH TIME OUT				TOTAL 1973-76 BEHAV PHD'S		PERCENT WITH TIME OUT			
	SURVEY RESP	TOTAL	NONE	1 YEAR	2-3 YEARS	MORE THAN 3 YRS	SURVEY RESP	TOTAL	NONE	1 YEAR	2-3 YEARS	MORE THAN 3 YRS
BOTH SEXES	11761	13125	59.7	17.3	12.1	10.8	13487	14619	57.3	14.9	13.2	14.6
US NATIVE BORN WHITES	8652	9102	61.2	16.5	11.9	10.4	10936	11410	58.0	14.5	13.2	14.2
US NATIVE BORN MINORITIES	410	438	53.2	14.6	13.4	18.8	552	589	49.8	14.9	13.0	22.3
BLACKS	188	200	38.8	16.5	16.0	28.7	331	355	47.1	14.2	14.2	24.5
AMERICAN INDIANS	40	42	52.5	22.5	10.0	15.0	65	67	56.9	13.8	12.3	16.9
CHICANOS	49	53	57.1	18.4	14.3	10.2	63	70	55.6	17.5	9.5	17.5
PUERTO RICANS	20	22	50.0	10.0	15.0	25.0	34	36	50.0	14.7	11.8	23.5
ASIANS	113	121	76.1	8.0	9.7	6.2	59	61	50.8	16.9	11.9	20.3
OTHER US NATIVE BORN	855	1391	60.2	18.4	11.3	10.1	968	1462	58.5	16.4	13.0	12.1
FOREIGN BORN	1844	2194	54.0	21.6	12.8	11.6	1031	1158	52.8	17.7	13.5	16.0
MALES	9007	10104	61.2	16.9	12.4	9.5	9229	9989	57.5	15.2	14.1	13.3
US NATIVE BORN WHITES	6619	6986	62.8	16.2	12.1	9.0	7495	7795	58.2	14.9	14.0	12.9
US NATIVE BORN MINORITIES	303	328	54.1	13.5	15.2	17.2	366	390	50.3	16.9	13.4	19.4
BLACKS	125	136	36.8	15.2	20.8	27.2	207	221	47.3	16.9	16.4	19.3
AMERICAN INDIANS	29	31	51.7	24.1	10.3	13.8	49	50	59.2	16.3	8.2	16.3
CHICANOS	45	48	60.0	17.8	13.3	8.9	52	58	53.8	17.3	9.6	19.2
PUERTO RICANS	16	18	50.0		18.8	31.3	24	25	54.2	16.7	12.5	16.7
ASIANS	88	95	77.3	8.0	9.1	5.7	34	36	47.1	17.6	8.8	26.5
OTHER US NATIVE BORN	709	1135	61.1	17.6	12.8	8.5	708	1065	59.3	14.8	13.8	12.0
FOREIGN BORN	1376	1655	54.9	20.8	13.2	11.1	660	739	51.1	17.9	15.9	15.2
FEMALES	2754	3021	55.1	18.8	11.0	15.1	4258	4630	57.1	14.3	11.3	17.3
US NATIVE BORN WHITES	2033	2116	56.1	17.4	[illegible]	15.1	3441	3615	57.7	13.6	11.6	17.1
US NATIVE BORN MINORITIES	107	110	50.5	17.8	8.4	23.4	186	199	48.9	10.8	12.4	28.0
BLACKS	63	64	42.9	19.0	6.3	31.7	124	134	46.8	9.7	10.5	33.1
AMERICAN INDIANS	11	11	54.5	18.2	9.1	18.2	16	17	50.0	6.3	25.0	18.8
CHICANOS	4	5	25.0	25.0	25.0	25.0	11	12	63.6	18.2	9.1	9.1
PUERTO RICANS	4	4	50.0	50.0			10	11	40.0	10.0	10.0	40.0
ASIANS	25	26	72.0	8.0	12.0	8.0	25	25	56.0	16.0	16.0	12.0
OTHER US NATIVE BORN	146	256	56.2	21.9	4.1	17.8	260	397	56.2	20.9	10.8	12.3
FOREIGN BORN	468	539	51.5	24.1	11.5	12.8	371	419	55.8	17.5	9.2	17.5

APP. J6 NUMBER OF DEPENDENTS AT COMPLETION OF DOCTORAL PROGRAM IN THE BIOMEDICAL AND BEHAVIURAL SCIENCES, 1975-76

SEX AND RACIAL GROUP	TOTAL 1975-76 BIOMED PHD'S SURVEY RESP	TOTAL	PERCENT WITH NUMBER OF DEPENDENTS TOTALLING NONE	1	2-3	MORE THAN 3	TOTAL 1975-76 BEHAV PHD'S SURVEY RESP	TOTAL	PERCENT WITH NUMBER OF DEPENDENTS TOTALLING NONE	1	2-3	MORE THAN 3
BOTH SEXES	5577	7166	41.3	24.1	29.4	5.2	6290	8122	44.1	23.7	26.8	5.4
US NATIVE BORN WHITES	4289	5182	43.3	23.9	28.0	4.8	5215	6486	45.1	23.8	26.1	5.0
US NATIVE BORN MINORITIES	169	222	35.5	24.3	32.5	7.7	316	380	41.1	22.2	28.5	8.2
BLACKS	75	96	28.0	22.7	40.0	9.3	203	237	40.9	22.7	29.1	7.4
AMERICAN INDIANS	17	24	29.4	41.2	17.6	11.8	27	39	44.4	22.2	22.2	11.1
CHICANOS	24	34	29.2	25.0	41.7	4.2	38	47	31.6	18.4	34.2	15.8
PUERTO RICANS	7	10	28.6		28.6	42.9	22	25	40.9	22.7	27.3	9.1
ASIANS	46	58	54.3	23.9	21.7		26	32	53.8	23.1	23.1	
OTHER US NATIVE BORN	101	386	42.6	26.7	28.7	2.0	119	376	42.0	26.1	23.5	8.4
FOREIGN BORN	1018	1376	33.6	24.7	35.0	6.8	640	880	38.4	22.7	32.3	6.6
MALES	4297	5468	30.8	26.8	36.0	6.5	4328	5477	32.3	26.8	33.5	7.3
US NATIVE BORN WHITES	3284	3944	32.3	27.2	34.4	6.1	3584	4352	33.0	27.3	32.9	6.8
US NATIVE BORN MINORITIES	120	158	24.2	25.8	40.8	9.2	203	247	32.0	21.7	35.5	10.8
BLACKS	47	60	17.0	19.1	51.1	12.8	121	141	32.2	21.5	36.4	9.9
AMERICAN INDIANS	12	16	16.7	50.0	25.0	8.3	17	28	35.3	23.5	29.4	11.8
CHICANOS	22	32	27.3	22.7	45.5	4.5	33	41	27.3	18.2	36.4	18.2
PUERTO RICANS	6	8	16.7		33.3	50.0	15	18	33.3	20.0	33.3	13.3
ASIANS	33	42	36.4	33.3	30.3		17	19	35.3	29.4	35.3	
OTHER US NATIVE BORN	88	316	36.4	28.4	33.0	2.3	98	286	38.8	26.5	25.5	9.2
FOREIGN BORN	805	1050	25.0	25.2	41.7	8.1	443	592	26.0	25.3	40.0	8.8
FEMALES	1280	1698	76.6	14.9	7.3	1.1	1962	2645	70.2	16.7	11.8	1.3
US NATIVE BORN WHITES	1005	1238	79.4	13.0	6.8	.8	1631	2134	71.7	16.2	11.1	1.0
US NATIVE BORN MINORITIES	49	64	63.3	20.4	12.2	4.1	113	133	57.5	23.0	15.9	3.5
BLACKS	28	36	46.4	28.6	21.4	3.6	82	96	53.7	24.4	18.3	3.7
AMERICAN INDIANS	5	8	60.0	20.0		20.0	10	11	60.0	20.0	10.0	10.0
CHICANOS	2	2	50.0	50.0			5	6	60.0	20.0	20.0	
PUERTO RICANS	1	2	100.0				7	7	57.1	28.6	14.3	
ASIANS	13	16	100.0				9	13	88.9	11.1		
OTHER US NATIVE BORN	13	70	84.6	15.4			21	90	57.1	23.8	14.3	4.8
FOREIGN BORN	213	326	66.2	22.5	9.4	1.9	197	288	66.5	16.8	15.2	1.5

APP. J7.1 RECENT TRENDS IN THE POSTGRADUATION PLANS OF DOCTORATE RECIPIENTS IN THE BIOMEDICAL SCIENCES, 1973-76

	PHD'S WITH EMPL PLANS		PERCENT PLANNING POSTDOC				PERCENT PLANNING EMPLOYMENT				
SEX AND RACIAL GROUP	SURVEY RESP	TOTAL	TOTAL	FELL/ TRNEE	RES ASSOC	OTHER	TOTAL	ACAD	BUSN	GOVT	OTHER
BOTH SEXES	10592	10676	58.0	34.9	16.8	6.3	42.0	24.8	6.6	6.9	3.7
US NATIVE BORN WHITES	7859	7917	56.7	34.3	15.6	6.8	43.3	25.7	6.6	7.4	3.6
US NATIVE BORN MINORITIES	369	373	50.1	32.8	13.3	4.1	49.9	34.7	3.8	8.9	2.4
BLACKS	166	169	35.5	21.7	11.4	2.4	64.5	47.6	2.4	11.4	3.0
AMERICAN INDIANS	37	37	48.6	32.4	13.5	2.7	51.4	32.4	8.1	8.1	2.7
CHICANOS	44	44	61.4	47.7	9.1	4.5	38.6	31.8		6.8	
PUERTO RICANS	18	19	27.8	11.1	11.1	5.6	72.2	50.0	5.6	11.1	5.6
ASIANS	104	104	73.1	48.1	18.3	6.7	26.9	13.5	5.8	5.8	1.9
OTHER US NATIVE BORN	723	728	52.7	31.3	14.9	6.5	47.3	29.6	6.5	7.9	3.3
FOREIGN BORN	1641	1658	68.4	39.8	24.6	4.0	31.6	16.1	7.1	3.5	4.8
MALES	8251	8317	56.7	32.9	16.9	6.9	43.3	24.0	7.8	7.9	3.6
US NATIVE BORN WHITES	6082	6127	55.6	32.4	15.7	7.6	44.4	24.5	7.9	8.5	3.5
US NATIVE BORN MINORITIES	286	288	49.7	32.5	12.6	4.5	50.3	32.9	4.5	10.5	2.4
BLACKS	122	123	34.4	20.5	10.7	3.3	65.6	45.1	3.3	13.9	3.3
AMERICAN INDIANS	26	26	42.3	26.9	11.5	3.8	57.7	38.5	7.7	11.5	
CHICANOS	39	39	61.5	48.7	7.7	5.1	38.5	30.8		7.7	
PUERTO RICANS	15	16	26.7	13.3	13.3		73.3	46.7	6.7	13.3	6.7
ASIANS	84	84	72.6	47.6	17.9	7.1	27.4	11.9	7.1	6.0	2.4
OTHER US NATIVE BORN	609	613	51.9	30.0	15.3	6.6	48.1	29.6	7.4	8.2	3.0
FOREIGN BORN	1274	1289	65.6	36.7	24.6	4.3	34.4	17.0	8.6	3.9	4.9
FEMALES	2341	2359	62.8	42.1	16.5	4.1	37.2	27.7	2.1	3.5	3.9
US NATIVE BORN WHITES	1777	1790	60.5	41.0	15.2	4.3	39.5	29.9	2.3	3.5	3.8
US NATIVE BORN MINORITIES	83	85	51.8	33.7	15.7	2.4	48.2	41.0	1.2	3.6	2.4
BLACKS	44	46	38.6	25.0	13.6		61.4	54.5		4.5	2.3
AMERICAN INDIANS	11	11	63.6	45.5	18.2		36.4	18.2	9.1		9.1
CHICANOS	5	5	60.0	40.0	20.0		40.0	40.0			
PUERTO RICANS	3	3	33.3			33.3	66.7	66.7			
ASIANS	20	20	75.0	50.0	20.0	5.0	25.0	20.0		5.0	
OTHER US NATIVE BORN	114	115	57.0	37.7	13.2	6.1	43.0	29.8	1.8	6.1	5.3
FOREIGN BORN	367	369	77.9	50.7	24.3	3.0	22.1	13.4	1.9	2.2	4.6

APP. J7.2 RECENT TRENDS IN THE POSTGRADUATION PLANS OF DOCTORATE RECIPIENTS IN THE BEHAVIORAL SCIENCES, 1973-76

	PHD'S WITH EMPL PLANS		PERCENT PLANNING POSTDOC				PERCENT PLANNING EMPLOYMENT				
SEX AND RACIAL GROUP	SURVEY RESP	TOTAL	TOTAL	FELL/ TRNEE	RES ASSOC	OTHER	TOTAL	ACAD	BUSN	GOVT	OTHER
BOTH SEXES	11515	11595	12.0	7.9	2.4	1.6	88.0	52.8	5.1	15.2	14.9
US NATIVE BORN WHITES	9389	9449	11.9	7.9	2.3	1.7	88.1	51.4	5.4	15.9	15.5
US NATIVE BORN MINORITIES	493	499	8.9	5.9	2.0	1.0	91.1	66.3	2.6	10.3	11.8
BLACKS	294	298	6.5	4.1	1.0	1.4	93.5	73.8	.7	9.2	9.9
AMERICAN INDIANS	51	52	3.9	3.9			96.1	52.9	5.9	15.7	21.6
CHICANOS	61	62	18.0	9.8	6.6	1.6	82.0	55.7	6.6	4.9	14.8
PUERTO RICANS	32	32	12.5	9.4	3.1		87.5	56.3	9.4	15.6	6.3
ASIANS	55	55	14.5	10.9	3.6		85.5	56.4	1.8	14.5	12.7
OTHER US NATIVE BORN	789	794	9.8	6.7	1.8	1.3	90.2	58.7	3.8	15.2	12.5
FOREIGN BORN	844	853	17.3	10.5	5.1	1.7	82.7	55.3	4.1	10.7	12.6
MALES	8044	8100	11.0	7.4	2.3	1.3	89.0	52.5	5.3	16.4	14.7
US NATIVE BORN WHITES	6561	6604	10.8	7.3	2.1	1.4	89.2	50.9	5.7	17.2	15.4
US NATIVE BORN MINORITIES	328	332	9.1	6.4	1.8	.9	90.9	65.5	3.4	10.1	11.9
BLACKS	184	186	4.9	3.3	.5	1.1	95.1	77.2	1.1	8.2	8.7
AMERICAN INDIANS	39	40	5.1	5.1			94.9	48.7	7.7	20.5	17.9
CHICANOS	52	53	21.2	11.5	7.7	1.9	78.8	53.8	3.8	5.8	15.4
PUERTO RICANS	22	22	18.2	13.6	4.5		81.8	50.0	13.6	9.1	9.1
ASIANS	31	31	12.9	12.9			87.1	48.4	3.2	16.1	19.4
OTHER US NATIVE BORN	591	594	8.6	6.3	1.7	.7	91.4	59.9	3.7	15.7	12.0
FOREIGN BORN	564	570	17.0	10.5	5.3	1.2	83.0	56.2	3.7	11.2	11.9
FEMALES	3471	3495	14.2	9.0	2.9	2.4	85.8	53.5	4.5	12.5	15.2
US NATIVE BORN WHITES	2828	2845	14.3	9.1	2.8	2.4	85.7	52.5	4.7	12.8	15.7
US NATIVE BORN MINORITIES	165	167	8.5	4.8	2.4	1.2	91.5	67.9	1.2	10.9	11.5
BLACKS	110	112	9.1	5.5	1.8	1.8	90.9	68.2		10.9	11.8
AMERICAN INDIANS	12	12					100.0	66.7			33.3
CHICANOS	9	9					100.0	66.7	22.2		11.1
PUERTO RICANS	10	10					100.0	70.0		30.0	
ASIANS	24	24	16.7	8.3	8.3		83.3	66.7		12.5	4.2
OTHER US NATIVE BORN	198	200	13.1	8.1	2.0	3.0	86.9	55.1	4.0	13.6	14.1
FOREIGN BORN	280	283	17.9	10.7	4.6	2.5	82.1	53.6	5.0	9.6	13.9

APP. J8 RECENT TRENDS IN THE EMPLOYMENT PROSPECTS OF DOCTORATE RECIPIENTS IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES AT THE COMPLETION OF THEIR GRADUATE PROGRAMS, 1973-76

	TOTAL 1973-76 BIOMED PHD'S		PERCENT WITH				TOTAL 1973-76 BEHAV PHD'S		PERCENT WITH			
SEX AND RACIAL GROUP	SURVEY RESP	TOTAL	FIRM COMMIT	TENTATIVE PLANS	NO PLANS	OTHER	SURVEY RESP	TOTAL	FIRM COMMIT	TENTATIVE PLANS	NO PLANS	OTHER
BOTH SEXES	12213	13125	76.9	10.5	12.2	.4	13761	14619	74.1	10.2	15.2	.5
US NATIVE BORN WHITES	8919	9102	78.8	10.0	10.8	.4	11204	11410	74.5	9.9	15.1	.5
US NATIVE BORN MINORITIES	429	438	76.0	11.0	12.8	.2	575	589	74.4	12.3	12.7	.5
BLACKS	197	200	75.6	10.2	14.2		343	355	74.6	12.2	12.5	.6
AMERICAN INDIANS	42	42	71.4	16.7	11.9		66	67	65.2	13.6	19.7	1.5
CHICANOS	51	53	72.5	13.7	13.7		70	70	75.7	12.9	11.4	
PUERTO RICANS	20	22	70.0	25.0	5.0		35	36	88.6	2.9	8.6	
ASIANS	119	121	80.7	6.7	11.8	.8	61	61	73.8	16.4	9.8	
OTHER US NATIVE BORN	813	1391	79.2	10.3	10.1	.4	901	1462	77.1	11.0	11.2	.7
FOREIGN BORN	2052	2194	68.2	12.6	19.0	.2	1081	1158	67.3	11.7	20.4	.7
MALES	9403	10104	78.6	9.9	11.4	.2	9409	9989	76.7	9.3	13.6	.4
US NATIVE BORN WHITES	6852	6986	80.2	9.2	10.4	.2	7669	7795	77.1	9.0	13.5	.3
US NATIVE BORN MINORITIES	322	328	78.6	10.9	10.6		381	390	75.3	11.8	12.3	.5
BLACKS	134	136	82.8	9.0	8.2		214	221	74.8	12.1	12.6	.5
AMERICAN INDIANS	31	31	67.7	16.1	16.1		49	50	71.4	10.2	16.3	2.0
CHICANOS	46	48	71.7	13.0	15.2		58	58	77.6	13.8	8.6	
PUERTO RICANS	17	18	70.6	23.5	5.9		24	25	91.7		8.3	
ASIANS	94	95	80.9	8.5	10.6		36	36	69.4	16.7	13.9	
OTHER US NATIVE BORN	681	1135	80.8	9.3	9.7	.3	665	1065	79.2	10.1	10.5	.2
FOREIGN BORN	1548	1655	70.3	12.9	16.6	.1	694	739	71.6	10.5	17.3	.6
FEMALES	2810	3021	71.4	12.6	15.0	1.1	4352	4630	68.3	12.0	18.7	1.0
US NATIVE BORN WHITES	2067	2116	73.9	12.7	12.2	1.2	3535	3615	68.8	11.7	18.6	.9
US NATIVE BORN MINORITIES	107	110	68.2	11.2	19.6	.9	194	199	72.7	13.4	13.4	.5
BLACKS	63	64	60.3	12.7	27.0		129	134	74.4	12.4	12.4	.8
AMERICAN INDIANS	11	11	81.8	18.2			17	17	47.1	23.5	29.4	
CHICANOS	5	5	80.0	20.0			12	12	66.7	8.3	25.0	
PUERTO RICANS	3	4	66.7	33.3			11	11	81.8	9.1	9.1	
ASIANS	25	26	80.0		16.0	4.0	25	25	80.0	16.0	4.0	
OTHER US NATIVE BORN	132	256	71.2	15.9	12.1	.8	236	397	71.2	13.6	13.1	2.1
FOREIGN BORN	504	539	61.5	11.7	26.2	.6	387	419	59.4	13.7	25.8	1.0

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APP. J9 EMPLOYMENT FIELD OF 1973-76 DOCTORATE RECIPIENTS
IN THE BIOMEDICAL AND BEHAVIORAL SCIENCES

	BIOMED PHD'S W/ EMPL PLANS		PERCENT EMPLOYED IN				BEHAV PHD'S W/ EMPL PLANS		PERCENT EMPLOYED IN			
SEX AND RACIAL GROUP	SURVEY RESP	TOTAL	BIOMED	OTHER SCI	EDUC	HUMAN & OTHER	SURVEY RESP	TOTAL	BEHAV	OTHER SCI	EDUC	HUMAN & OTHER
BOTH SEXES	9209	10676	92.4	6.3	.5	.7	9457	11595	89.7	5.0	2.8	2.5
US NATIVE BORN WHITES	6862	7917	92.2	6.4	.6	.8	7727	9449	89.6	5.0	2.8	2.5
US NATIVE BORN MINORITIES	304	373	94.1	4.3	1.3	.3	385	499	86.5	5.5	4.4	3.6
BLACKS	132	169	92.4	5.3	2.3		228	298	86.0	5.7	4.8	3.5
AMERICAN INDIANS	31	37	93.5	3.2	3.2		39	52	84.6	2.6	5.1	7.7
CHICANOS	34	44	94.1	2.9		2.9	48	62	91.7	6.3		2.1
PUERTO RICANS	16	19	93.8	6.3			24	32	83.3	8.3	4.2	4.2
ASIANS	91	104	96.7	3.3			46	55	87.0	4.3	6.5	2.2
OTHER US NATIVE BORN	635	728	90.2	8.0	.5	1.3	654	794	90.2	4.5	2.4	2.4
FOREIGN BORN	1408	1658	94.3	5.1	.1	.5	691	853	91.0	4.1	2.9	2.0
MALES	7160	8317	92.1	6.8	.4	.6	6579	8100	90.3	4.5	2.5	2.6
US NATIVE BORN WHITES	5301	6127	91.9	7.0	.5	.7	5379	6604	90.2	4.6	2.6	2.6
US NATIVE BORN MINORITIES	238	288	93.7	4.2	1.7	.4	254	332	89.0	5.5	2.4	3.1
BLACKS	100	123	91.0	6.0	3.0		138	186	88.4	4.3	3.6	3.6
AMERICAN INDIANS	21	26	90.5	4.8	4.8		32	40	87.5	3.1	3.1	6.3
CHICANOS	29	39	96.6			3.4	40	53	92.5	7.5		
PUERTO RICANS	13	16	92.3	7.7			19	22	84.2	10.5		5.3
ASIANS	75	84	97.3	2.7			25	31	92.0	8.0		
OTHER US NATIVE BORN	538	613	90.5	8.6	.4	.6	486	594	91.4	4.1	1.9	2.7
FOREIGN BORN	1083	1269	93.5	5.8	.1	.6	460	570	91.5	3.5	2.6	2.4
FEMALES	2049	2359	93.7	4.4	.9	1.1	2878	3495	88.1	6.0	3.5	2.4
US NATIVE BORN WHITES	1561	1790	93.2	4.7	1.1	1.0	2348	2845	88.3	6.1	3.2	2.4
US NATIVE BORN MINORITIES	66	85	95.5	4.5			131	167	81.7	5.3	8.4	4.6
BLACKS	32	46	96.9	3.1			90	112	82.2	7.8	6.7	3.3
AMERICAN INDIANS	10	11	100.0				7	12	71.4		14.3	14.3
CHICANOS	5	5	80.0	20.0			8	9	87.5			12.5
PUERTO RICANS	3	3	100.0				5	10	80.0		20.0	
ASIANS	16	20	93.8	6.3			21	24	81.0		14.3	4.8
OTHER US NATIVE BORN	97	115	88.7	5.2	1.0	5.2	168	200	86.9	7.1	4.2	1.8
FOREIGN BORN	325	369	96.9	2.8		.3	231	283	90.0	5.2	3.5	1.3

App. J10.1 Median Salary by Sex[a]

	Males[b]	Females[b]	Difference
Overall biomedical median	$19,042	$16,409	$2,633
Postdoctorals	12,169	11,745	424
Academic	19,299	17,787	1,512
Government	21,775	20,594	1,181
Business	23,235	22,026	1,209
Other	20,264	19,167	1,097
Overall (minus postdoctorals)	20,041	18,141	1,900
Overall behavioral median	19,943	17,485	2,458
Postdoctorals	12,653	11,315	1,338
Academic	19,513	18,082	1,431
Government	21,262	20,145	1,117
Business	25,176	22,300	2,876
Other	20,468	19,538	930
Overall (minus postdoctorals)	20,021	18,396	1,625

[a] The sources for Appendixes J10-J17 are NRC, Survey of Biomedical and Behavioral Scientists, Washington, D.C., 1976, and NRC, Survey of Earned Doctorates, Washington, D.C., 1971-75.

[b] Reflects the salaries of 1971-75 Ph.D. recipients employed full-time in October, 1976.

App. J10.2 Median Salary by Sex, Age, and Sector of Employment Among Biomedical Ph.D.'s

	Under 30			30-39			40 and Over		
	Males	Females	Difference	Males	Females	Difference	Males	Females	Difference
TOTAL	$15,213	$12,837	$2,376	$19,283	$16,358	$2,925	$23,300	$18,424	$9,357
Postdoctorals	11,573	11,460	113	12,326	11,788	538			
Academic	17,771	16,654	1,117	19,349	17,765	1,584	21,905	18,366	3,539
Government	18,923			21,392	20,893	499	24,533		
Business	20,406			23,192	21,600	1,592	25,324		
Other				20,250					
Overall (minus postdocs)	18,180	17,179	1,001	20,004	18,073	1,931	23,719	19,000	4,719

App. J10.3 Median Salary by Sex, Age, and Sector of Employment Among Behavioral Ph.D.'s

	Under 30			30-39			40 and Over		
	Males	Females	Difference	Males	Females	Difference	Males	Females	Difference
TOTAL	$17,439	$17,485	$ 46	$20,005	$18,113	$1,892	$21,641	$20,250	$1,391
Postdoctorals	11,536	10,833	703	12,917	11,550	1,367			
Academic	17,073	17,167	94	19,573	18,000	1,573	20,761	20,162	599
Government	19,375			21,315	19,583	1,732	25,500	21,000	4,500
Business				25,009	16,389	8,620			
Other	18,043	19,500	970	20,621	19,783	838	24,630	19,050	5,580
Overall (minus postdocs)	17,604	17,783	179	20,071	18,224	1,847	21,655	20,306	1,349

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[a] Reflects the salaries of 1971-75 Ph.D. recipients employed full-time in October 1976.

APP. J11 EMPLOYMENT STATUS OF 1971-75 BIOMEDICAL AND BEHAVIORAL PH.D. RECIPIENTS[a]

	ALL PHD'S		PERCENT OF TIME IN				
	SURVEY RESP	EST TOTAL	POST DOC	F-T EMPL	P-T EMPL	SEEK EMPL	OTHER STATUS
OTAL BIOMEDICAL PHD'S	4378	14288	37.36	54.34	2.36	1.48	4.47
MALES-MARRIED	2699	8651	33.29	61.38	1.40	.77	3.16
MALES-NOT MARRIED	674	2192	45.40	44.24	2.46	1.95	6.00
MALES-MARITAL STATUS UNK	106	400	42.44	51.18	1.89	1.30	3.21
FEMALES-MARRIED	485	1638	41.56	37.00	7.16	4.29	9.99
FEMALES-NOT MARRIED	398	1353	43.49	48.31	2.60	1.93	3.68
FEMALES-MARITAL STAT UNK	16	54	45.57	35.65	2.74	1.67	14.43
OTAL BEHAVIORAL PHD'S	3844	15926	6.52	83.45	5.89	2.01	2.14
MALES-MARRIED	2026	8581	5.25	90.26	2.28	1.06	1.15
MALES-NOT MARRIED	565	2332	10.06	79.88	4.99	2.73	2.36
MALES-MARITAL STATUS UNK	57	371	1.71	94.38	.69	1.93	1.30
FEMALES-MARRIED	680	2631	7.87	66.17	16.97	3.95	5.05
FEMALES-NOT MARRIED	498	1903	7.04	79.09	8.53	2.83	2.53
FEMALES-MARITAL STAT UNK	18	108	4.90	79.47	14.40	0.00	1.34

APP. J12 CURRENT (OCTOBER 1976) EMPLOYMENT STATUS OF 1971-75 BIOMEDICAL AND BEHAVIORAL PH.D. RECIPIENTS

	ALL PHD'S		PERCENT CURRENTLY IN				
	SURVEY RESP	EST TOTAL	POST DOC	F-T EMPL	P-T EMPL	SEEK EMPL	OTHER STATUS
TOTAL BIOMEDICAL PHD'S	4429	14288	20.0	74.0	1.6	1.7	2.7
MALES-MARRIED	2730	8651	15.6	81.4	.6	.9	1.5
MALES-NOT MARRIED	683	2192	28.0	65.5	1.6	1.9	3.0
MALES-MARITAL STATUS UNK	107	400	21.0	76.3	.5	1.8	.5
FEMALES-MARRIED	490	1638	26.4	53.6	6.8	5.5	7.7
FEMALES-NOT MARRIED	403	1353	27.3	65.2	2.2	1.4	3.9
FEMALES-MARITAL STAT UNK	16	54	27.8	55.6		3.7	13.0
TOTAL BEHAVIORAL PHD'S	3892	15926	2.9	88.2	5.4	2.4	1.1
MALES-MARRIED	2049	8581	2.0	94.5	1.7	1.5	.3
MALES-NOT MARRIED	572	2332	4.6	84.9	5.1	3.1	2.2
MALES-MARITAL STATUS UNK	58	371		96.2	2.2	1.6	
FEMALES-MARRIED	690	2631	3.3	72.4	16.4	5.6	2.2
FEMALES-NOT MARRIED	504	1903	4.5	84.2	7.1	1.7	2.5
FEMALES-MARITAL STAT UNK	19	108		85.2	14.8		

APP. J13 1971-75 BIOMEDICAL AND BEHAVIORAL PH.D. RECIPIENTS TAKING POSTDOCTORAL APPOINTMENTS WITHIN A YEAR AFTER EARNING DOCTORATE

	ALL PHD'S		PERCENT WHO HELD APPT	HELD POSTDOC		PERCENT TAKING APPT FOR			
	SURVEY RESP	EST TOTAL		SURVEY RESP	EST TOTAL	RES EXPER	FIELD SWTCH	NO EMPL	OTHER REASON
TOTAL BIOMEDICAL PHD'S	4429	14288	55.7	2323	7957	61.9	16.1	13.3	8.7
MALES-MARRIED	2730	8651	51.8	1309	4482	61.6	15.7	15.3	7.4
MALES-NOT MARRIED	683	2192	65.1	421	1427	64.8	16.1	11.3	7.7
MALES-MARITAL STATUS UNK	107	400	61.5	61	246	61.3	18.1	7.4	13.2
FEMALES-MARRIED	490	1638	59.3	293	972	58.9	16.3	12.6	12.3
FEMALES-NOT MARRIED	403	1353	58.6	231	793	62.3	18.1	7.5	12.0
FEMALES-MARITAL STAT UNK	16	54	68.5	8	37	70.3	8.1	21.6	
TOTAL BEHAVIORAL PHD'S	3892	15926	12.0	556	1907	42.0	10.8	19.4	27.8
MALES-MARRIED	2049	8581	9.6	238	820	45.3	9.6	25.7	19.4
MALES-NOT MARRIED	572	2332	18.2	125	424	45.8	10.6	16.3	27.4
MALES-MARITAL STATUS UNK	58	371	5.1	4	19	31.6	68.4		
FEMALES-MARRIED	690	2631	13.4	103	352	35.7	8.3	17.4	38.6
FEMALES-NOT MARRIED	504	1903	14.6	84	278	37.4	14.4	11.2	37.1
FEMALES-MARITAL STAT UNK	19	108	13.0	2	14				100.0

APP. J14 EMPLOYMENT SECTOR OF 1971-75 BIOMEDICAL AND BEHAVIORAL PH.D. RECIPIENTS

	ALL EMPLOYED		PERCENT EMPLOYED OR ON POSTDOCTORAL APPOINTMENTS IN													
			EDUCATIONAL INSTITUTION					***GOVERNMENT***			****BUSINESS****			**OTHER SECTORS**		
	SURVEY RESP	EST TOTAL	TOTAL	UNIV/ COLL	MED SCHL	PROF SCHL	OTHER EDUC	TOTAL	FEDL GOVT	OTHER GOVT	TOTAL	PHARM FIRM	OTHER BUSN	TOTAL	HOSP/ CLNIC	OTHER TYPE
TOTAL BIOMEDICAL PHD'S	4200	13671	70.2	29.8	30.9	7.2	2.2	11.4	9.7	1.7	11.7	4.3	7.5	6.7	2.8	3.9
MALES-MARRIED	2639	8447	66.3	27.1	29.4	8.2	1.7	12.6	10.7	1.9	14.3	4.9	9.3	6.8	2.8	4.1
MALES-NOT MARRIED	636	2085	73.3	31.9	32.2	6.6	2.5	10.6	9.0	1.6	8.9	3.6	5.3	7.2	3.6	3.6
MALES-MARITAL STATUS UNK	101	391	72.4	35.1	33.6	3.6		19.6	18.3	1.3	5.4	1.3	4.1	2.6		2.6
FEMALES-MARRIED	425	1422	77.2	35.6	33.0	4.3	4.4	7.8	6.6	1.2	7.6	4.3	3.3	7.3	2.5	4.8
FEMALES-NOT MARRIED	386	1281	81.3	36.1	35.8	6.0	3.4	6.6	5.2	1.3	6.3	2.0	4.4	5.9	2.6	3.3
FEMALES-MARITAL STAT UNK	13	45	84.4	42.2	37.8	4.4		4.4		4.4	11.1	6.7	4.4			
TOTAL BEHAVIORAL PHD'S	3716	15362	64.4	49.1	7.4	1.8	6.1	12.5	6.4	6.2	9.5	.1	9.4	13.5	7.3	6.2
MALES-MARRIED	1995	8432	62.8	50.3	6.0	.9	5.5	14.5	8.1	6.5	9.5	.1	9.4	13.2	6.9	6.3
MALES-NOT MARRIED	535	2208	63.2	45.6	11.3	1.3	5.0	11.9	5.8	6.1	8.9	.1	8.8	16.0	11.5	4.5
MALES-MARITAL STATUS UNK	57	365	71.5	47.4	7.7		16.4	8.8	7.7	1.1	17.3		17.3	2.5	.5	1.9
FEMALES-MARRIED	629	2426	66.1	49.1	7.6	2.5	6.9	8.5	2.6	5.9	11.0	.1	10.9	14.3	6.7	7.6
FEMALES-NOT MARRIED	481	1823	68.9	49.0	7.8	5.2	6.8	10.6	4.3	6.4	7.2		7.2	13.3	6.2	7.1
FEMALES-MARITAL STAT UNK	19	108	79.6	38.0	20.4	10.2	11.1	8.3		8.3				12.0	12.0	

PP. J15 WORK ACTIVITIES OF 1971-75 BIOMEDICAL AND BEHAVIORAL PH.D. RECIPIENTS

	ALL EMPLOYED		PERCENT OF TIME SPENT IN						
	SURVEY RESP	EST TOTAL	R&D	TEACH	MGMT/ ADMIN	CON SULT	OTHER PROF SERV	OTHER ACTIVITY	PERCENT WIT SOME TIME IN RESEARCH
OTAL BIOMEDICAL PHD'S	4160	13671	55.50	23.53	11.10	2.78	5.40	1.69	89.5
MALES-MARRIED	2613	8447	53.01	23.68	12.65	3.00	6.18	1.47	89.9
MALES-NOT MARRIED	627	2085	60.18	20.56	7.92	2.74	5.47	3.13	89.2
MALES-MARITAL STATUS UNK	100	391	56.07	22.74	9.69	2.67	8.14	0.70	91.1
FEMALES-MARRIED	421	1422	62.81	24.87	7.23	2.17	1.99	0.93	87.9
FEMALES-NOT MARRIED	386	1281	55.61	26.10	10.80	2.20	3.38	1.92	88.5
FEMALES-MARITAL STAT UNK	13	45	66.40	19.56	8.71	1.11	0.22	4.00	75.6
OTAL BEHAVIORAL PHD'S	3666	15362	24.33	32.05	14.80	8.47	18.07	2.28	78.1
MALES-MARRIED	1972	8432	23.97	32.33	16.22	8.45	17.18	1.85	79.7
MALES-NOT MARRIED	530	2208	27.15	28.79	13.48	9.84	18.32	2.43	81.0
MALES-MARITAL STATUS UNK	54	365	23.70	31.63	18.83	5.97	17.71	2.16	75.3
FEMALES-MARRIED	617	2426	24.98	32.19	12.48	7.99	19.46	2.90	76.2
FEMALES-NOT MARRIED	474	1823	21.21	34.48	12.26	8.43	20.25	3.38	70.1
FEMALES-MARITAL STAT UNK	19	108	35.17	33.90	12.69	1.94	16.31	0.00	88.9

APP. J16 TENURED AND POSTDOCTORAL POSITIONS HELD BY 1971-75 BIOMEDICAL AND BEHAVIORAL PH.D.'S IN THE ACADEMIC SECTOR

	EMPLOYED IN ACADEMIA		PERCENT IN			
	SURVEY RESP	EST TOTAL	TENR POS	TENR TRACK	POST DOC	OTHER NONTENR
TOTAL BIOMEDICAL PHD'S	2882	9463	12.0	43.8	25.0	19.3
MALES-MARRIED	1710	5526	15.1	49.7	19.6	15.5
MALES-NOT MARRIED	457	1491	6.0	36.6	35.2	22.3
MALES-MARITAL STATUS UNK	66	280	10.2	50.9	20.0	18.9
FEMALES-MARRIED	340	1094	7.5	30.4	33.7	28.5
FEMALES-NOT MARRIED	299	1034	9.3	34.7	31.0	25.0
FEMALES-MARITAL STAT UNK	10	38		36.8	39.5	23.7
TOTAL BEHAVIORAL PHD'S	2419	9417	27.1	49.6	3.8	19.5
MALES-MARRIED	1280	5057	32.8	49.7	2.2	15.4
MALES-NOT MARRIED	338	1317	20.2	49.5	6.4	24.0
MALES-MARITAL STATUS UNK	35	226	24.3	49.5		26.2
FEMALES-MARRIED	408	1534	22.0	46.5	5.3	26.1
FEMALES-NOT MARRIED	342	1197	18.3	53.2	7.1	21.4
FEMALES-MARITAL STAT UNK	16	86	15.1	50.0		34.9

APP. J17 RELEVANCE OF DOCTORAL DEGREE, TRAINING, AND RESEARCH EXPERIENCE TO PRESENT EMPLOYMENT SITUATION OF 1971-75 BIOMEDICAL AND BEHAVIORAL PH.D.'S

	LABOR FORCE		PERCENT WHO CONSIDER PHD		
	SURVEY RESP	EST TOTAL	ESSEN TIAL	USE FUL	NOT USED
TOTAL BIOMEDICAL PHD'S	3363	11046	88.5	7.5	4.0
MALES-MARRIED	2230	7178	90.5	7.0	2.6
MALES-NOT MARRIED	452	1512	86.4	8.5	5.1
MALES-MARITAL STATUS UNK	77	314	92.4	4.8	2.9
FEMALES-MARRIED	318	1079	77.9	9.6	12.4
FEMALES-NOT MARRIED	275	931	87.8	8.0	4.2
FEMALES-MARITAL STAT UNK	11	32	81.3	12.5	6.3
TOTAL BEHAVIORAL PHD'S	3673	15292	85.2	9.6	5.1
MALES-MARRIED	1977	8385	87.6	9.0	3.4
MALES-NOT MARRIED	524	2172	85.2	7.9	6.9
MALES-MARITAL STATUS UNK	58	371	89.5	8.9	1.6
FEMALES-MARRIED	637	2485	78.6	10.5	10.8
FEMALES-NOT MARRIED	458	1771	82.0	13.8	4.2
FEMALES-MARITAL STAT UNK	19	108	91.7	8.3	

APPENDIX K

ADMINISTRATION OF THE NRSA PROGRAM

Title 42—Public Health

CHAPTER I—PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PART 66—NATIONAL RESEARCH SERVICE AWARDS

On January 17, 1975 a notice of proposed rulemaking was published in the FEDERAL REGISTER (40 FR 3074) proposing addition of a new Part 66 to 42 CFR for the purpose of implementing section 472 of the Public Health Service Act, as added by the National Research Service Award Act of 1974 (Title I, Public Law 93-348), which authorized the Secretary of Health, Education, and Welfare to make: (1) National Research Service Awards directly to individuals for biomedical and behavioral research and research training and (2) grants to institutions to enable them to make National Research Service Awards to individuals for such research and research training.

Interested persons were invited to submit, on or before February 18, 1975, written comments regarding the proposed regulations.

Several comments were received. A number of these were not concerned directly with the regulations but rather questioned the desirability of the payback requirements in section 472(c) of the enabling legislation. Inasmuch as these requirements are nevertheless mandated by the legislation, none of the comments disputed the necessity for implementing such requirements in the regulations.

The following comments were received on the regulations themselves:

1. It was urged that references to "optometry" and "podiatry" be included in §§ 66.102 (g) and (k). These references have been added to the final version of the regulations.

2. It was also suggested that the words "or equivalent degree" be added to § 66.102(j). This suggestion has been adopted.

3. In addition it was suggested that, in determining whether it would be an extreme hardship and against equity and good conscience to require payback, for purposes of § 66.111, an added factor to be considered should be whether the individual had received sufficient training to be qualified to perform any of the various types of services that would count as payback. Since this consideration might indeed be one factor to be weighed in making such determinations, an appropriate clause to that effect has been added to § 66.111.

4. The suggestion was made that applications from individuals and organizations in each State be reviewed by "a single State agency" and that awards be made through that agency. This suggestion was not adopted, since section 472 contains no reference to State agencies but instead mandates review by councils of the National Institutes of Health and Alcohol, Drug Abuse, and Mental Health Administration and directs that awards be made by the Secretary. Also, in general, awards of this kind do not usually have a major impact on the health activities of States and local jurisdictions and are not subject to the requirements in the Intergovernmental Cooperation Act of 1968 for reporting of grant information to States.

5. It was requested that further information be provided as to what types of activity would constitute "biomedical and behavioral research or teaching" for purposes of the service payback requirement in § 66.110(a)(1). At this stage in the implementation of section 472, the Department does not have sufficient experience with regard to the operation of the payback requirement to be more explicit in the regulations.

6. It was pointed out that many programs of research training last more than three years and urged that the limitation in § 66.106(b) be dropped. This is not possible, since it reflects a statutory requirement in section 472(b)(4). In any event, it may be waived for good cause under § 66.106(d).

7. With further regard to § 66.106(d), concern was expressed as to whether "good cause" could be found only if the applicant proposed to complete both predoctoral and postdoctoral training under his or her National Research Service Award. However, as § 66.106(d) indicates, the circumstance described was just an example of a situation in which "good cause" may be found to exist, depending on the facts of the particular case.

8. Objection was raised to the "full-time" requirement in § 66.103(b) because it might prevent the recipient of an Award from engaging in other academic duties while carrying out research or research training under the Award. This requirement has long been a part of NIH and ADAMHA fellowship and training programs and is considered necessary to achieve the purposes of these programs.

9. Finally, it was requested that senior investigators be allowed to receive National Research Service Awards. There is no age limit on eligibility for these Awards, and senior investigators who apply therefor will be considered along with all other applicants.

In addition to those additions and revisions already noted, several minor changes have been made in the regulations, all editorial or technical in nature.

This part shall become effective on May 2, 1975.

Dated: April 2, 1975.

THEODORE COOPER,
Acting Assistant Secretary for Health.

Approved: April 24, 1975.

CASPAR W. WEINBERGER,
Secretary.

Accordingly, Title 42 of the Code of Federal Regulations is amended by adding a new Part 66, as follows:

Subpart A—Direct Awards

Sec.
66.101 Applicability.
66.102 Definitions.
66.103 Eligibility.
66.104 Application.
66.105 Requirements.
66.106 Awards.
66.107 Payments to awardees.
66.108 Payments to institutions.
66.109 Termination.
66.110 Service, payback, and recovery requirements.
66.111 Suspension, waiver, and cancellation.
66.112 Nondiscrimination.
66.113 Human subjects; animal welfare.
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Subpart B—Institutional Grants

Sec.
66.201 Applicability.
66.202 Definitions.
66.203 Eligibility.
66.204 Application.
66.205 Requirements.
66.206 Grant awards.
66.207 Payment.
66.208 Expenditure of grant funds.
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66.211 Applicability of 45 CFR Part 74.
66.212 Progress and fiscal records and reports.
66.213 Grantee accountability.
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66.215 Additional conditions.

AUTHORITY: Sec. 215, 58 Stat. 690, as amended (42 U.S.C. 216); sec. 472, 88 Stat. 342 (42 U.S.C. 289*l*–1).

Subpart A—Direct Awards

§ 66.101 Applicability.

The regulations in this subpart are applicable to National Research Service Awards by the Secretary, under section 472(a)(1)(A) of the Public Health Service Act, as amended (42 U.S.C. 289*l*–1(a)(1)(A)), to individuals for: (a) Biomedical and behavioral research at the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration in matters relating to the cause, diagnosis, prevention, and treatment of the disease (or diseases) or other health problems to which the activities of NIH and ADAMHA are directed, (b) training at NIH and ADAMHA of individuals to undertake such research, (c) biomedical and behavioral research at non-Federal public and nonprofit private institutions, and (d) predoctoral and postdoctoral training at such institutions of individuals to undertake such research.

§ 66.102 Definitions.

As used in this subpart:

(a) "Act" means the Public Health Service Act, as amended.

(b) "Secretary" means the Secretary of Health, Education, and Welfare and any other officer or employee of the Department of Health, Education, and Welfare to whom the authority involved has been delegated.

(c) "NIH" means the National Institutes of Health.

(d) "ADAMHA" means the Alcohol, Drug Abuse, and Mental Health Administration.

(e) "Nonprofit" as applied to any institution means an institution which is a corporation or association no part of the net earnings of which inures or may lawfully inure to the benefit of any private shareholder or individual.

(f) "Award" means a National Research Service Award under section 472 of the Act (42 U.S.C. 289*l*–1).

(g) "Residency" means post-graduate training, for doctors of medicine, osteopathy, dentistry, optometry, and podiatry, nurses, and other individuals providing health care directly to patients, where the majority of their time is spent in non-research clinical training.

(h) "National Health Service Corps" means the Corps referred to in section 329 of the Act (42 U.S.C. 254b).

(i) "Noncitizen national of the United States" means a person who, though not a citizen of the United States, owes permanent allegiance to the United States (8 U.S.C. 1101(a)(22)).

(j) "Predoctoral training" means training at the post-baccalaureate level in a program leading to the award of a doctor of philosophy or science, or equivalent degree.

(k) "Postdoctoral training" means training of individuals holding a doctor of philosophy, science, medicine, dentistry, osteopathy, optometry, podiatry, veterinary medicine, engineering, nursing sciences, public health, or equivalent degree.

§ 66.103 Eligibility.

To be eligible for a National Research Service Award under this subpart an individual must:

(a) Be a citizen or noncitizen national of the United States or have been lawfully admitted to the United States for permanent residence at the time of application; and

(b) Propose to engage in full-time biomedical or behavioral research, or training to undertake such research, at NIH, ADAMHA, or a non-Federal public or nonprofit private institution.

§ 66.104 Application.

(a) Application for an Award under this subpart shall be made on a form approved for that purpose by the Secretary. The completed form, executed by the individual applicant, shall be submitted to NIH or ADAMHA on or before such dates as the Secretary may prescribe.

(b) In addition to any other pertinent information that the Secretary may require, each application shall set forth in detail:

(1) The applicant's educational background and other qualifications and experience, including previous academic and professional degrees;

(2) The subject area of the proposed research or training;

(3) The proposed period of Award;

(4) If the proposed period of Award is in excess of three years, the justifications for such request; and

(5) The availability at the institution where the research or training would be conducted of resources and facilities necessary to carry out such research or training.

§ 66.105 Requirements.

No Award shall be made to an individual under this subpart unless:

(a) The individual has submitted to the Secretary a written assurance (in such form as the Secretary may prescribe) that he or she will satisfy the requirements of §§ 66.110(a) and 66.110(b) of this subpart;

(b) If the proposed research or training would take place at a non-Federal institution, such institution has submitted a written assurance (in such form as the Secretary may prescribe), executed by a representative of the institution authorized to act for the institution and to assume on behalf of the institution the obligations imposed by the terms and conditions of the Award including the regulations of this subpart, indicating that the applicant has been accepted to the institution for the purpose of engaging in the research or training for which an Award is being sought, that the Award is not to be used to support a residency, and that, in the event an Award is made, the institution will make available to the applicant any resources and facilities described in the application as necessary to carry out such research or training;

(c) Effective July 1, 1975, the proposed research or training is in a subject area for which there is a need for personnel, as determined under section 473 of the Act (42 U.S.C. 289*l*–2); and

(d) The individual has submitted a written assurance (in such form as the Secretary may prescribe) that the Award is not to be used to support a residency.

§ 66.106 Awards.

(a) Within the limits of funds available, the Secretary shall make Awards to those applicants:

(1) Whose applications have been reviewed and recommended for approval by appropriate advisory councils within NIH and ADAMHA;

(2) Who have satisfied the requirements of § 66.105 of this subpart; and

(3) Whose proposed research or training would, in the judgment of the Secretary, best promote the purposes of section 472(a)(1)(A) of the Act, taking into consideration among other pertinent factors:

(i) The scientific, technical, or educational merit of the particular proposal;

(ii) The availability of resources and facilities to carry it out;

(iii) The qualifications and experience of the applicant; and

(iv) The degree of the need for personnel in the subject area of the proposed research or training.

(b) All Awards shall be in writing and shall specify the period of the Award (which may not exceed three years in the aggregate for any individual unless the Secretary for good cause shown waives the application of this limitation to such individual), the total recommended stipends and allowances provided for the entire period of the Award, the amount awarded for the initial year of said period (see § 66.107), and (if the Award is made for research or training at a non-Federal institution) the amount of the payments to the institution for the cost of services provided the awardee by such institution during the initial year of said period (see § 66.108).

(c) Neither the approval of any application nor any Award shall commit or obligate the United States in any way to make any additional, supplemental, continuation, or other Award with respect to any approved application or portion thereof.

(d) In determining what constitutes "good cause" for purposes of paragraph (b) of this section, the Secretary shall take into account such factors as whether the applicant proposes to complete both predoctoral and postdoctoral training programs under the Award or whether the applicant proposes to pursue a combined program leading to the degrees of doctor of medicine and doctor of philosophy.

§ 66.107 Payments to awardees.

(a) Individuals receiving Awards shall be entitled to such stipends and allowances as the Secretary may designate, taking into account such factors as the needs of the program, the cost of living, and the availability of funds.

(b) Payments of stipends and allowances shall, at the discretion of the Secretary, be made to the awardee or the sponsoring institution for payment to the awardee.

§ 66.108 Payments to institutions.

(a) Where an Award is made to an individual under this subpart for research or training at a non-Federal public or nonprofit private institution, the institution shall be entitled to an allowance to help defray the cost of support services (including the cost of faculty salaries, supplies, equipment, general research support, and related items) provided such individual by the institution. The amount of any such payments to any institution shall be determined by the Secretary based upon the reasonable costs to the institution of establishing and maintaining the quality of its biomedical and behavioral research and training programs.

(b) Payments to the institution under this section may be made either in advance or by way of reimbursement, as prescribed by the Secretary.

§ 66.109 Termination.

(a) The Secretary may terminate an Award prior to its normal expiration date:

(1) At the written request of the awardee; or

(2) If the Secretary finds that the awardee has materially failed to comply with the terms and conditions of the Award or to carry out the purpose for which it was made.

(b) In the event an Award is terminated the Secretary shall notify the awardee in writing of this determination, the reasons therefor, the effective date, and any procedural rights available.

§ 66.110 Service, payback, and recovery requirements.

(a) Each individual who receives an Award shall upon completion thereof:

(1) Engage in biomedical or behavioral research or teaching for a period equal to the period of support, or

(2) If the Secretary determines that there are no suitable research or teaching positions available to such individual, and if such individual is a physician, dentist, nurse, or other individual trained to provide health care directly to individual patients, and if the Secretary so authorizes such individual, in lieu of engaging in research or training:

(i) Serve as a member of the National Health Service Corps for a period equal to the period of support;

(ii) Serve in his specialty in private practice in a geographic area designated by the Secretary as requiring that specialty for 20 months for each twelve months of support; or

(iii) Provide services in his specialty for a health maintenance organization to which payments may be made under section 1876 of Title XVIII of the Social Security Act and which serves an underserved population (as defined in section 1302(7) of the Act) for 20 months for each 12 months of support; or

(3) If the Secretary determines that there are no suitable research or teaching positions available to an individual, and if such individual is not trained to provide health care directly to individual patients, and if the Secretary so authorizes such individual, in lieu of engaging in research or teaching, engage in a health activity appropriate to his education and training for 20 months for each 12 months of support.

(b) Except as provided in section 111 of this subpart, an individual to whom the requirement for service in paragraph (a) of this section is applicable must begin to undertake such service on a continuous basis within two years after the termination of his or her Award.

(c) If an individual fails to undertake or perform such service in accordance with the requirements of paragraph (b) of this section, the United States shall be entitled to recover from such individual an amount determined in accordance with the formula:

$$A = \phi\left(\frac{t - (\frac{3}{5})s}{t}\right)$$

in which "A: is the amount the United States is entitled to recover; "φ" is the sum of the total amount of stipends paid under one or more Awards to such individual and the interest on such amount which would be payable if at the time it was paid it was a loan bearing interest at a rate fixed by the Secretary of the Treasury after taking into consideration private consumer rates of interest prevailing at the time the Award was made; "t" is total number of months in such individual's service obligation; and "s" is the number of months of such obligation served by him in accordance with paragraph (a) of this section.

(d) Except as provided in § 66.111 of this subpart, any amount which the United States is entitled to recover under paragraph (c) shall, within the three-year period beginning on the date the United States becomes entitled to recover such amount, be paid to the United States. Until any amount due the United States under paragraph (c) of this section on account of any Award is paid, there shall accrue to the United States interest on such amount at the same rate as that fixed by the Secretary of the Treasury under paragraph (c) of this section to determine the amount due the United States.

§ 66.111 Suspension, waiver, and cancellation.

(a) The Secretary may extend the period for undertaking service prescribed in § 66.110(b) of this subpart, permit breaks in service under § 66.110(b), or extend the period for repayment under § 66.110(d) if the Secretary determines that:

(1) Such an extension or break in service is necessary so the individual may complete his or her research training;

(2) Completion during said period would be impossible because the individual is temporarily disabled; or

(3) Completion during said period would involve an extreme hardship to such individual and failure to extend such period would be against equity and good conscience.

(b) The Secretary may waive, in whole or in part, the obligation of such individual to repay pursuant to § 66.110(c) if the Secretary determines that:

(1) Fulfillment would be impossible because the individual is permanently and totally disabled; or

(2) Fulfillment would involve an extreme hardship to such individual and enforcement of such obligation would be against equity and good conscience.

(c) In making determinations under §§ 66.111(a)(3) and (b)(2), the Secretary will take into consideration such factors as:

(1) The individual's present financial resources and obligations;

(2) The individual's estimated future financial resources and obligations;

(3) The reasons for the individual's failure to complete such requirements within the prescribed period, such as problems of a personal nature;

(4) The extent to which the individual has been engaged in activities encompassed by § 66.110(a);

(5) Whether the individual has received sufficient training to be qualified to perform any such activities; and

(6) The unavailability of employment opportunities appropriate to the individual's education and training.

(d) Any obligation of any individual under this subpart will be cancelled upon the death of such individual.

§ 66.112 Nondiscrimination.

Attention is called to the fact that funds paid to an institution under § 66.108 of this subpart are considered Federal financial assistance to such institution. The institution is thus subject to:

(a) The prohibition against discrimination on the basis of race, color, or national origin imposed by Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. 2000d et seq.) and the implementing regulation of the Department of Health, Education, and Welfare (45 CFR Part 80);

(b) The prohibition against discrimination on the basis of sex imposed by Title IX of the Education Amendments of 1972 and in particular section 901 of such Act (20 U.S.C. 1681); and

(c) The prohibition against discrimination against the handicapped imposed by section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794).

§ 66.113 Human subjects; animal welfare.

Where the application is for research or training at a non-Federal public or non-profit private institution, no Award may be made under this subpart unless said institution has complied with:

(a) 45 CFR Part 46 and any other applicable requirements pertaining to the protection of human subjects.

(b) Chapter 1-43 of the Department of Health, Education, and Welfare Grants Administration Manual[1] and any other applicable requirements concerning animal welfare.

§ 66.114 Publications.

Publication, distribution, and disposition of all manuscripts and other materials resulting from an Award shall be subject to the conditions that all such materials shall bear appropriate acknowledgment of Department of Health, Education, and Welfare support and that the awardee shall furnish such copies of these manuscripts or other materials as the Secretary may reasonably request.

§ 66.115 Copyright.

Where the work accomplished under an Award results in a book or other copyrightable material, the author is free to copyright the work, but the United States reserves a royalty-free, nonexclusive, and irrevocable license to reproduce, publish, or otherwise use, and to authorize others to use, all copyrightable or copyrighted material resulting from the Award.

§ 66.116 Inventions and discoveries.

(a) Any Award is subject to the regulations of the Department of Health, Education, and Welfare set forth in 45 CFR Parts 6 and 8, as amended. Such regulations shall apply to any activity for which Award funds are in fact used, whether within the scope of the Award as approved or otherwise. Each such invention or discovery shall be promptly and fully reported to the Assistant Secretary for Health, Department of Health, Education, and Welfare.

(b) Determination as to ownership and disposition of rights to such invention or discovery, including whether a patent application shall be filed, and, if so, the manner of obtaining, administering, and disposing of rights under any patent application or patent which may issue shall be made either:

(1) By the Assistant Secretary for Health, whose decision shall be final, or

(2) Where an Award is made to an individual for research or training at a non-Federal public or nonprofit private institution having a separate formal institutional patent agreement with the Department of Health, Education, and Welfare, by the institution in accordance with that agreement.

§ 66.117 Additional conditions.

The Secretary may with respect to any Award or class of Awards impose additional conditions prior to or at the time of any Award when in his judgment such conditions are necessary to assure the carrying out of the purposes of the Award, the interests of the public health, or the conservation of funds awarded.

Subpart B—Institutional Grants

§ 66.201 Applicability.

The regulations in this subpart are applicable to grants under section 472(a)(1)(B) of the Public Health Service Act, as amended (42 U.S.C. 289*l*-1(a)(1)(B)), to non-Federal public institutions and to nonprofit private institutions to enable such institutions to make to individuals selected by them National Research Service Awards for research and predoctoral and postdoctoral training to undertake such research in matters relating to the cause, diagnosis, prevention, and treatment of the disease (or diseases) or other health problems to which the activities of the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration are directed.

§ 66.202 Definitions.

The definitions in § 66.102 of subpart A of this part shall apply as well to this subpart.

§ 66.203 Eligibility.

To be eligible for a grant under this subpart, an applicant must be:

(a) A non-Federal public or nonprofit private institution; and

(b) Located in a State, the District of Columbia, Puerto Rico, the Virgin Islands, the Canal Zone, Guam, American Samoa, or the Trust Territory of the Pacific Islands.

§ 66.204 Application.

(a) Each institution desiring a grant under this subpart shall submit an application on a form approved for that purpose by the Secretary, on or before such dates as the Secretary may prescribe. Such application shall be executed by an individual authorized to act for the applicant and to assume on behalf of the applicant the obligations imposed by the terms and conditions of the grant, including the regulations of this subpart.

(b) In addition to any other pertinent information that the Secretary may require, each application shall set forth in detail:

(1) The subject area or areas in which the proposed research or training will be conducted;

(2) The resources and facilities available to the applicant for use by recipients of Awards in carrying out such research or training;

(3) The names, qualifications, and experience of the program director and principal staff members who will be responsible for the proposed program;

(4) The criteria to be employed in selecting individuals to be recipients of Awards;

(5) The estimated number of recipients of Awards under the grant;

(6) The proposed period of support and a detailed budget and justification for the amount of grant funds requested; and

(7) Proposed methods for monitoring and evaluating the performance of individual recipients of Awards, as well as the overall program.

§ 66.205 Requirements.

(a) No Award shall be made to an individual under a grant pursuant to this subpart unless:

(1) The individual has submitted to the Secretary a written assurance (in such form as the Secretary may prescribe) that he or she will satisfy the requirements of §§ 66.110 (a) and (b) of subpart A of this part;

(2) Effective July 1, 1975, such Award is for research or training in a subject area for which there is a need for personnel, as determined under section 473 of the Act (42 U.S.C. 289*l*-2);

(3) The individual is a citizen or noncitizen national of the United States or has been lawfully admitted to the United States for permanent residence at the time of application;

(4) The Award includes a provision for termination in the event the recipient is found by the institution to have materially failed to comply with the terms and conditions of the Award or to carry out the purpose for which it was made; and

(5) The Award is not to be used to support a residency.

(b) No Award shall be made to an individual under such grant which exceeds three years in the aggregate unless the Secretary for good cause shown as provided in § 66.106(d) of subpart A of this part, waives the application of this limitation to such individual.

(c) The provisions of §§ 66.110 and 66.111 of subpart A of this part constitute terms and conditions of any Award made under a grant pursuant to this subpart.

§ 66.206 Grant awards.

(a) Within the limits of funds available, the Secretary shall award grants to those applicants:

(1) Whose applications have been reviewed and recommended for approval by appropriate advisory councils within NIH and ADAMHA;

(2) Who have satisfied the requirements of § 66.205 of this subpart; and

(3) Whose proposed programs would, in the judgment of the Secretary, best promote the purposes of section 472(a)(1)(B) of the Act, taking into consideration among other pertinent factors:

(i) The scientific, technical, or educational merit of the proposed program;

(ii) The adequacy of the resources and facilities available to the applicant;

(iii) The qualifications and experience of the program director and principal staff members;

(iv) The degree of the need for personnel in the subject area or areas of the proposed research or training;

(v) The administrative and managerial capability of the applicant;

(vi) The reasonableness of the proposed budget in relation to the proposed program; and

(vii) The adequacy of the methods for monitoring and evaluating the performance of individual recipients and the overall program.

(b) All grant awards shall be in writing and shall specify the period of support, the total recommended amount of funds for the entire period of support, the approved budget for the initial budget period, and the amount awarded for the initial budget period.

(c) Neither the approval of any application nor any grant award shall commit or obligate the United States in any way to make any additional, supplemental, continuation, or other grant award with respect to any approved application or portion thereof.

(d) The amount of any grant award shall be determined by the Secretary on the basis of his estimate of the sum necessary during the budget period: (1) To provide stipends and allowances to individual recipients of Awards and payments to the institution, as determined in accordance with §§ 66.107(a) and 66.108(a) of subpart A of this part, and (2) otherwise to carry out the grant award.

§ 66.207 Payment.

The Secretary shall from time to time make payments to a grantee of all or a portion of any grant award, either in advance or by way of reimbursement, for expenses incurred or to be incurred in accordance with its approved application.

§ 66.208 Expenditure of grant funds.

(a) Any funds granted pursuant to this subpart shall be expended solely for the purposes for which the funds were granted in accordance with the approved application and budget, the regulations of this subpart, the terms and conditions of the award, and the applicable cost principles prescribed by subpart Q of 45 CFR Part 74.

(b) Any unobligated grant funds remaining in the grant account at the close of a budget period may, with prior

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[1] The Department of Health, Education, and Welfare Grants Administration Manual is available for public inspection and copying at the Department's and Regional Offices' information centers listed in 45 CFR § 5.31 and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

approval by the Secretary, be carried forward and remain available for obligation during the remainder of the period of support, subject to such limitations as the Secretary may prescribe. The amount of any subsequent award will take into consideration unobligated grant funds remaining in the grant account. At the end of the period of support any unobligated grant funds remaining in the grant account must be refunded to the United States.

§ 66.209 Nondiscrimination.

(a) Attention is called to the requirements of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. 2000d et seq.) which provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. A regulation implementing such Title VI, which is applicable to grants made under this subpart, has been issued by the Secretary of Health, Education, and Welfare with the approval of the President (45 CFR Part 80).

(b) Attention is also called to the requirements of Title IX of the Education Amendments of 1972 and in particular to section 901 of such Act (20 U.S.C. 1681) which provides that no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.

(c) Grant funds used for alterations and renovations shall be subject to the condition that the grantee shall comply with the requirements of Executive Order 11246, 30 FR 12319 (September 24, 1965), as amended, and with the applicable rules, regulations, and procedures prescribed pursuant thereto.

(d) Attention is called to the requirements of section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), which provides that no otherwise qualified handicapped individual in the United States shall, solely by reason of his handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.

§ 66.210 Human subjects; animal welfare.

No grant award may be made under this subpart unless the applicant has complied with:

(a) 45 CFR Part 46 and any other applicable requirements pertaining to the protection of human subjects.

(b) Chapter 1-43 of the Department of Health, Education, and Welfare Grants Administration Manual[1] and any other applicable requirements concerning animal welfare.

§ 66.211 Applicability of 45 CFR Part 74.

The provisions of 45 CFR Part 74, establishing uniform administrative requirements and cost principles, shall apply to all grants under this subpart to State and local governments as those terms are defined in Subpart A of that Part 74. The relevant provisions of the following subparts of Part 74 shall also apply to grants to all other grantee organizations under this subpart:

45 CFR PART 74

Subpart	
A	General.
B	Cash Depositories.
C	Bonding and Insurance.
D	Retention and Custodial Requirements for Records.
F	Grant-Related Income.
G	Matching and Cost Sharing.
K	Grant Payment Requirements.
L	Budget Revision Procedures.
M	Grant Closeout Suspension, and Termination.
O	Property.
[illegible]	Cost Principles.

§ 66.212 Progress and fiscal records and reports.

Each grant award shall require that the grantee maintain such progress and fiscal records and file with the Secretary, such progress and fiscal reports relating to the conduct and results of the approved grant and the use of grant funds as the Secretary may find necessary to carry out the purposes of this subpart.

§ 66.213 Grantee accountability.

(a) All payments made by the Secretary shall be recorded by the grantee in accounting records separate from the records of all other grant funds, including funds derived from other grant awards. With respect to each approved program the grantee shall account for the sum total of all amounts paid by presenting or otherwise making available to the Secretary, satisfactory evidence of expenditures for direct and indirect costs meeting the requirements of this subpart.

(b) Accounting for royalties. Royalties received by grantees from copyrights on publications or other works developed under the grant, or from patents or inventions conceived or first actually reduced to practice in the course of or under such grant, shall be accounted for as follows:

(1) State and local governments. Where the grantee is a State or local government as those terms are defined in subpart A of 45 CFR Part 74, royalties shall be accounted for as provided in 45 CFR 74.44.

(2) Grantees other than State and local governments. Where the grantee is not a State or local government as those terms are defined in subpart A of 45 CFR Part 74, royalties shall be accounted for as follows:

(i) Patent royalties, whether received during or after the grant period, shall be governed by agreements between the Assistant Secretary for Health, Department of Health, Education, and Welfare, and the grantee, pursuant to the Department's patent regulations (45 CFR Parts 6 and 8).

(ii) Copyright royalties, whether received during or after the grant period, shall first be used to reduce the Federal share of the grant to cover the costs of publishing or producing the materials, and any royalties in excess of the costs of publishing or producing the materials shall be distributed in accordance with Chapter 1-420 of the Department of Health, Education, and Welfare Grants Administration Manual.

§ 66.214 Publications and copyright.

(a) State and local governments. Where the grantee is a State or local government as those terms are defined in subpart A of 45 CFR Part 74, the Department of Health, Education, and Welfare copyright requirement set forth in 45 CFR 74.140 shall apply with respect to any book or other copyrightable materials developed or resulting from an activity supported by a grant under this subpart.

(b) Grantees other than State and local governments. Where the grantee is not a State or local government as those terms are defined in subpart A of 45 CFR Part 74, except as may otherwise be provided under the terms and conditions of the grant award, the grantee may copyright without prior approval any publications, films, or similar materials developed or resulting from an activity supported by a grant under this subpart, subject to a royalty-free nonexclusive, and irrevocable license or right in the United States to reproduce, translate, publish, use, diseminate, and dispose of such materials, and to authorize others to do so.

§ 66.215 Additional conditions.

The Secretary, may with respect to any grant award impose additional conditions prior to or at the time of any award when in his judgment such conditions are necessary to assure or protect advancement of the approved program, the interests of the public health, or the conservation of grant funds.

[FR Doc.75-11388 Filed 5-1-75;8:45 am]

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[1] The Department of Health, Education, and Welfare Grants Administration Manual is available for public inspection and copying at the Department's and Regional Offices' information centers listed in 45 CFR § 5.31 and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

APPENDIX K2

NRSA RULES AND REGULATIONS--MAY 1977

Title 42—Public Health[1]

CHAPTER I—PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PART 66—NATIONAL RESEARCH SERVICE AWARDS

Amendment To Permit Undergraduate Training

AGENCY: Department of Health, Education, and Welfare, Public Health Service.

ACTION: Final rule technical amendment.

SUMMARY: This rule redefines the term "predoctoral training" in the National Research Service Award regulations. This revision encompasses undergraduate research training and is necessary in order to make the regulations comply with the express intent of Congress.

EFFECTIVE DATE: June 9, 1977.

FOR FURTHER INFORMATION CONTACT:

Elward Bynum, Program Director, Minority Access to Research Careers Program, NIGMS, NIH, Bethesda, Maryland 20014 (301-496-7357).

SUPPLEMENTARY INFORMATION: Section 472 of the Public Health Service Act authorizes the Secretary of Health, Education, and Welfare to make: (1) National Research Service Awards directly to individuals for biomedical and behavioral research and predoctoral and postdoctoral training to engage in such research, and (2) grants to institutions to enable them to make National Research Service Awards to individuals for such research and training. This legislation was implemented by regulations published in the FEDERAL REGISTER on May 2, 1975 (40 FR 19314), and codified in 42 CFR Part 66.

Section 66.102 of these regulations defines "predoctoral training" to mean "training at the post-baccalaureate level in a program leading to the award of doctor of philosophy or science, or equivalent degree." However, in appropriating funds for the National Institute of General Medical Sciences (NIGMS), as part of the HEW Appropriations Act for fiscal year 1977 (Pub. L. 94-439), Congress indicated that a portion of the funds earmarked for research training should be used for undergraduate training under NIGMS' Minority Access to Research Careers (MARC) Program (Senate Report No. 94-997, at page 57). In order to accomplish this, it is necessary to redefine the term "predoctoral training" in the regulations to encompass undergraduate training.

The amendment to § 66.102 of the regulations set forth below is intended to accomplish this purpose.

In view of the amendment's limited scope, and the need to publicize the new category of eligibility, receive and evaluate applications, and make awards before the end of the fiscal year, the Department has determined that notice and public procedure with respect to this amendment are impracticable and unnecessary and that good cause exists for making the amendment effective upon publication.

NOTE.—The Department of Health, Education, and Welfare has determined that this document does not contain a major proposal requiring preparation of an Inflation Impact Statement under Executive Order 11821 and OMB Circular A-107.

Dated: May 9, 1977.

JAMES F. DICKSON,
Acting Assistant Secretary for Health.

Approved: May 27, 1977.

JOSEPH A. CALIFANO, Jr.,
Secretary.

Accordingly, § 66.102 of Part 66 of Title 42 of the Code of Federal Regulations is amended by revising paragraph (j) to read as follows:

§ 66.102 Definitions.

* * * * *

(j) "Predoctoral training" means training at the post-baccalaureate level in a program leading to the award of a doctor of philosophy or science, or equivalent degree; except that for purposes of Awards under the Minority Access to Research Careers program of the National Institute of General Medical Sciences "predoctoral training" also means training in a program leading to the award of a baccalaureate degree in science or equivalent degree.

* * * * *

[FR Doc.77-16350 Filed 6-8-77;8:45 am]

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[1] From PHS (1977).

APPENDIX L

GRADUATE STUDENT SUPPORT IN THE BASIC BIOMEDICAL SCIENCES

APP. L1 Primary Source and Type of Support for Full-time Graduate Students in Doctoral Granting Departments in the Basic Biomedical Sciences by Department Quality Ratings, Fall 1972 and 1975[a]

	Fall 1972			Fall 1975		
	Total	≥3.5	Other	Total	≥3.5	Other
(N)	(3.353)	(411)	(2,942)	(3,331)	(431)	(2,900)
Total all sources	21,262	3,802	17,460	23,828	4,122	19,706
Fell/tr	7,813	2,310	5,503	7,170	2,179	4,991
RA	3,645	591	3,054	4,243	704	3,539
TA	5,332	458	4,874	6,213	555	5,658
Other	5,117	456	4,661	6,803	691	6,112
Total federal	8,223	2,366	5,857	7,512	2,203	5,309
Fell/tr	5,657	1,870	3,787	4,551	1,691	2,860
RA	2,156	440	1,716	2,619	488	2,131
TA	97	12	85	85	6	79
Other	313	44	269	257	18	239
NIH	5,768	1,838	3,930	5,568	1,795	3,773
Fell/tr	4,388	1,541	2,847	3,882	1,490	2,392
RA	1,235	255	980	1,509	288	1,221
TA	71	12	59	54	6	48
Other	74	30	44	123	11	112
Other HEW	662	149	513	255	35	220
Fell/tr	561	110	451	151	26	125
RA	79	38	41	72	8	64
TA	6		6	8		8
Other	16	1	15	24	1	23
Other federal	1,793	379	1,414	1,689	373	1,316
Fell/tr	708	219	489	518	175	343
RA	842	147	695	1,038	192	846
TA	20		20	23		26
Other	223	13	210	110	6	117
Total nonfed.	13,039	1,436	11,603	16,316	1,919	14,397
Fell/tr	1,511	427	1,084	2,018	481	1,537
RA	1,489	151	1,338	1,624	216	1,408
TA	5,235	446	4,785	6,128	549	5,579
Other	4,804	412	4,392	6,546	673	5,873
Inst/state	7,658	868	6,790	9,238	1,119	8,119
Fell/tr	1,014	285	729	1,462	330	1,132
RA	1,129	112	1,017	1,197	1,781	1,019
TA	5,173	442	4,731	6,087	548	5,539
Other	342	29	313	492	63	429
Self	4,089	342	3,747	5,750	544	5,206
Other nonfed.	1,292	226	1,066	1,328	256	1,072
Fell/tr	497	142	355	556	151	405
RA	360	39	321	427	38	389
TA	62	4	58	41	1	40
Other	373	41	332	304	66	238

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[a] Derived from NSF (1972-75) and Roose and Andersen (1970). Tabulations are based on a four-year matched set of departments for fall 1972 through fall 1975--906 in the basic biomedical sciences (50 percent of the 1975 population). Departments are bisected according to those receiving a quality rating of 3.5 or more and those receiving less than 3.5 (including departments not rated). A department may receive a rating between 0 and 5 (highest). Those rated 3.5 or more represent approximately 10 percent of all departments. Abbreviations used are: fell/tr = fellowship/traineeship, RA = research assistantship, TA = teaching assistantship, other = other types of support.

APP. L2 Percent Distribution of Primary Source and Type of Support for Full-time Graduate Students in Doctoral Granting Departments in the Basic Biomedical Sciences by Department Quality Ratings, Fall 1972 and 1975[a]

	Fall 1972			Fall 1975		
	Total	≥3.5	Other	Total	≥3.5	Other
Total all sources	100.0	100.0	100.0	100.0	100.0	100.0
Fell/tr	36.7	60.8	31.5	30.1	52.9	25.3
RA	17.1	15.5	17.5	17.8	17.1	18.0
TA	25.1	12.0	27.9	26.1	13.5	28.7
Other	24.1	12.0	26.7	28.6	16.8	31.0
Total federal	38.7	62.2	33.5	31.5	53.4	26.9
Fell/tr	26.6	49.2	21.7	19.1	41.0	14.5
RA	10.1	11.6	9.8	11.0	11.8	10.8
TA	.5	.3	.5	.4	.1	.4
Other	1.5	1.2	1.5	1.1	.4	1.2
NIH	27.1	48.3	22.5	23.4	43.5	19.1
Fell/tr	20.5	40.5	16.3	16.3	36.1	12.1
RA	5.8	6.7	5.6	6.3	7.0	6.2
TA	.3	.3	.3	.2	.1	.2
Other	.3	.8	.3	.5	.3	.6
Other HEW	3.1	3.9	2.9	1.1	.8	1.1
Fell/tr	2.6	2.9	2.6	.6	.6	.6
RA	.4	1.0	.2	.3	.2	.3
TA						
Other	.1		.1	.1		.1
Other federal	8.5	10.0	8.1	7.0	9.1	6.7
Fell/tr	3.4	5.8	2.8	2.2	4.3	1.8
RA	3.9	3.9	4.0	4.4	4.6	4.3
TA	.2		.2	.2		.2
Other	1.1	.4	1.2	.5	.1	.5
Total nonfed.	61.3	37.8	66.5	68.5	46.6	73.1
Fell/tr	7.1	11.2	6.2	8.5	11.7	7.8
RA	7.0	4.0	7.7	6.8	5.2	7.1
TA	24.6	11.7	27.4	25.7	13.3	28.3
Other	22.6	10.8	25.2	27.5	16.3	29.8
Inst/state	36.0	22.8	38.9	38.8	27.1	41.2
Fell/tr	4.8	7.5	4.2	6.1	8.0	5.7
RA	5.3	2.9	5.8	5.0	4.3	5.2
TA	24.3	11.6	27.1	25.5	13.3	28.1
Other	1.6	.8	1.8	2.1	1.5	2.2
Self	19.2	9.0	21.5	24.1	13.2	26.4
Other nonfed.	6.1	6.0	6.1	5.6	6.3	5.5
Fell/tr	2.3	3.7	2.0	2.4	3.7	2.1
RA	1.7	1.1	1.9	1.8	.9	1.9
TA	.3	.1	.3	.2		.2
Other	1.8	1.0	1.9	1.3	1.6	1.2

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[a] See Appendix L1 footnote.

APP. L3 Percent Change in Primary Source and Type of Support for Full-time Graduate Students in Doctoral Granting Departments in the Basic Biomedical Sciences by Department Quality Ratings, Fall 1972-75[a]

	Total	≥3.5	Other
Total all sources	12.1	8.4	12.9
Fell/tr	-8.2	-5.7	-9.3
RA	16.4	19.1	15.9
TA	16.5	21.2	16.1
Other	32.9	51.5	31.1
Total federal	-8.6	-6.9	-9.4
Fell/tr	-19.6	-9.6	-24.5
RA	21.5	10.9	24.2
TA	*	*	*
Other	-17.9	*	-11.2
NIH	-3.5	-2.3	-4.0
Fell/tr	-11.5	-3.3	-16.0
RA	22.2	12.9	24.6
TA	*	*	*
Other	*	*	*
Other HEW	-61.5	-76.5	-57.1
Fell/tr	-73.1	-76.4	-72.3
RA	*	*	*
TA	*	*	*
Other	*	*	*
Other federal	-5.8	-1.6	-6.9
Fell/tr	-26.8	-19.1	-30.0
RA	23.2	30.6	21.7
TA	*		*
Other	-50.7	*	-44.3
Total nonfed.	25.1	33.6	24.1
Fell/tr	33.6	12.6	41.8
RA	9.1	43.0	5.2
TA	17.1	23.1	16.5
Other	36.3	67.3	33.7
Inst/state	20.6	28.9	19.6
Fell/tr	44.2	15.8	35.3
RA	6.0	58.9	.2
TA	17.7	24.0	17.1
Other	43.9	*	37.1
Self	40.6	59.1	38.9
Other nonfed.	2.8	13.3	.6
Fell/tr	11.9	6.3	14.1
RA	18.6	-2.6	21.2
TA	*	*	*
Other	-18.5	*	-21.7

[a] See Appendix L1 footnote. Asterisk (*) means percent change was not computed because the base was less than 100.

APPENDIX M

GRADUATE STUDENT SUPPORT IN THE BEHAVIORAL SCIENCES

APP. M1 Primary Source and Type of Support for Full-time Graduate Students in Doctoral Granting Departments in the Behavioral Sciences by Department Quality Ratings, Fall 1972 and 1975[a]

	Fall 1972			Fall 1975		
	Total	≥3.5	Other	Total	≥3.5	Other
(N)	(1,883)	(247)	(1,636)	(1,831)	(249)	(1,582)
Total all sources	23,191	3,910	19,281	24,325	3,759	20,566
Fell/tr	5,957	1,422	4,535	4,606	1,129	3,477
RA	2,475	421	2,054	2,770	415	2,355
TA	5,081	509	4,572	5,379	588	4,791
Other	9,076	1,269	7,807	10,432	1,250	9,182
Total Federal	6,314	1,454	4,860	4,973	1,159	3,814
Fell/tr	4,691	1,141	3,550	3,389	892	2,497
RA	1,266	281	985	1,217	237	980
TA	28	1	27	49	7	42
Other	329	31	298	318	23	295
HEW	4,455	1,083	3,372	3,322	846	2,476
Fell/tr	3,658	900	2,758	2,560	675	1,885
RA	753	176	577	685	162	523
TA	12	1	11	30		30
Other	32	6	26	47	9	38
Other federal	1,859	371	1,488	1,651	313	1,338
Fell/tr	1,033	241	792	829	217	612
RA	513	105	408	532	75	457
TA	16		16	19	7	12
Other	297	25	272	271	14	257
Total nonfed.	16,877	2,456	14,421	19,352	2,600	16,752
Fell/tr	1,868	570	1,298	2,355	614	1,741
RA	1,209	140	1,069	1,553	178	1,375
TA	5,053	508	4,545	5,330	581	4,749
Other	8,747	1,238	7,509	10,114	1,227	8,887
Inst/state	8,219	1,137	7,082	9,244	1,331	7,913
Fell/tr	1,338	405	933	1,727	439	1,288
RA	1,029	85	944	1,309	109	1,200
TA	5,016	508	4,508	5,321	581	4,740
Other	836	139	697	887	202	685
Self	7,045	1,025	6,020	8,641	954	7,687
Other nonfed.	1,613	294	1,319	1,467	315	1,152
Fell/tr	530	165	365	628	175	453
RA	180	55	125	244	69	175
TA	37		37	9		9
Other	866	74	792	586	71	515

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[a] Derived from NSF (1972-75) and Roose and Andersen (1970). Tabulations are based on a four-year matched set of departments for fall 1972 through fall 1975--247 departments in the behavioral sciences (64 percent of the population). Departments are bisected according to those receiving a quality rating of 3.5 or more and those receiving less than 3.5 (including departments not rated). A department may receive a rating between 0 and 5 (highest). Those rated 3.5 or more represent approximately 10 percent of all departments. Abbreviations used are: fell/tr = fellowship/traineeship, RA = research assistantship, TA = teaching assistantship, other = other types of support.

APP. M2 Percent Distribution of Primary Source and Type of Support for Full-time Graduate Students in Doctoral Granting Departments in the Behavioral Sciences by Department Quality Ratings, Fall 1972 and 1975[a]

	Fall 1972			Fall 1975		
	Total	≥3.5	Other	Total	≥3.5	Other
Total all sources	100.0	100.0	100.0	100.0	100.0	100.0
Fell/tr	25.7	36.4	23.5	18.9	30.0	16.9
RA	10.7	10.8	10.7	11.4	11.0	11.5
TA	21.9	13.0	23.7	22.1	15.6	23.3
Other	39.1	32.5	40.5	42.9	33.3	44.6
Total federal	27.2	37.2	25.2	20.4	30.8	18.5
Fell/tr	20.2	29.2	18.4	13.9	23.7	12.1
RA	5.5	7.2	5.1	5.0	6.3	4.8
TA	.1		.1	.2	.2	.2
Other	1.4	.8	1.5	1.3	.6	1.4
HEW	19.2	27.7	17.4	13.7	22.5	12.0
Fell/tr	15.8	23.0	14.3	10.5	18.0	9.2
RA	3.2	4.5	3.0	2.8	4.3	2.6
TA				.2		.2
Other	.2	.1	.2	.2	.3	.2
Other federal	8.0	9.5	7.8	6.7	8.3	6.5
Fell/tr	4.4	6.2	4.1	3.4	5.7	2.9
RA	2.3	2.7	2.1	2.2	2.0	2.2
TA	.1		.1		.2	
Other	1.2	.7	1.3	1.1	.3	1.3
Total nonfed.	72.8	62.8	74.8	79.6	69.2	81.5
Fell/tr	8.1	14.6	6.7	9.7	16.3	8.5
RA	5.2	3.6	5.5	6.4	4.7	6.7
TA	21.8	13.0	23.6	21.9	15.5	23.1
Other	37.7	31.7	38.9	41.6	32.6	43.2
Inst/state	35.4	29.1	36.7	38.0	35.4	39.5
Fell/tr	5.8	10.4	4.8	7.1	11.7	6.3
RA	4.4	2.2	4.9	5.4	2.9	5.8
TA	21.6	13.0	23.4	21.9	15.5	23.0
Other	3.6	3.6	3.6	3.6	5.4	3.3
Self	30.4	26.2	31.2	35.5	25.4	37.4
Other nonfed.	7.0	7.5	6.9	6.1	8.4	5.6
Fell/tr	2.3	4.2	1.9	2.6	4.6	2.2
RA	.8	1.4	.6	1.0	1.8	.9
TA	.2		.2			
Other	3.7	1.9	4.1	2.5	1.8	2.5

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[a] See Appendix M1 footnote.

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APP. M3 Percent Change in Primary Source and Type of Support for Full-time Graduate Students in Doctoral Granting Departments in the Behavioral Sciences by Department Quality Ratings, Fall 1972-75[a]

	Total	≥3.5	Other
Total all sources	4.9	-3.9	6.7
Fell/tr	-22.7	-20.6	-23.3
RA	11.9	-1.4	14.7
TA	5.9	15.5	4.8
Other	14.9	-1.5	17.6
Total federal	-21.2	-20.3	-21.5
Fell/tr	-27.8	-21.8	-29.7
RA	-3.9	-15.7	-.5
TA	*	*	*
Other	-3.3	*	-1.9
HEW	-25.4	-21.9	-26.4
Fell/tr	-31.9	-25.9	-31.7
RA	-9.0	-8.0	-9.4
TA	*	*	*
Other	*	*	*
Other federal	-11.2	-15.6	-10.1
Fell/tr	-19.7	-10.0	-22.7
RA	3.7	*	12.0
TA	*	*	*
Other	-8.8	*	-5.5
Total nonfed.	14.7	5.9	16.2
Fell/tr	26.1	7.7	34.1
RA	28.5	27.1	28.6
TA	5.5	14.4	4.5
Other	15.6	-.9	18.4
Inst/state	12.5	17.1	11.7
Fell/tr	29.1	8.4	38.0
RA	27.2	28.2	27.1
TA	6.1	14.4	5.1
Other	6.1	45.3	-1.7
Self	22.7	-6.9	27.7
Other nonfed.	-9.1	7.1	-12.7
Fell/tr	18.5	6.0	24.1
RA	35.6	*	40.0
TA	*		*
Other	-32.3	*	-35.0

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[a] See Appendix M1 footnote. Asterisk (*) means percent change was not computed because the base was less than 100.

APPENDIX N

NIH/ADAMHA/HRA ANNOUNCEMENTS FOR FY 1978 NRSA PROGRAMS

NATIONAL RESEARCH SERVICE AWARDS

FOR

INSTITUTIONAL GRANTS

ANNOUNCEMENT

Subject to availability of funds and to periodic modification of research areas, applications for institutional research training grants will be received by NIH on February 1. Because of the timing of this announcement, for 1977 the receipt date will be April 1. The research area listing for 1977 is included in this announcement. Results of review will be announced, for most applications, the following October, with a start date of the following July 1. Announcement areas for April 1, 1977, are attached.

Under authority of Section 472 of the Public Health Service Act as amended (42 USC 289l-1), the National Institutes of Health (NIH) awards grants to eligible institutions to develop or enhance research training opportunities for individuals selected by them who are interested in careers in specified areas of biomedical and behavioral research. Title 42 of the Code of Federal Regulations, Part 66, is applicable to these awards.

Domestic nonprofit private or non-Federal public institutions may apply for grants to support training programs in specified areas of research. Pre- and postdoctoral trainees may be supported if either or both level(s) of training are justified in and approved on the basis of the application. The applicant institution must have, or be able to develop, the staff and facilities required for the proposed programs. The training program director at the institution will be responsible for the selection and appointment of trainees to receive National Research Service Awards and for the overall direction of the program.

The proposed program must encompass supervised biomedical research training in the specified areas, and offer opportunity for research training leading toward the research degree, or, in the case of research health scientists, research clinicians, etc., to broaden their scientific background. National Research Service Awards (NRSA) are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees. Neither will these awards support non-research clinical training.

Application Material Application materials may be obtained from the Grants Inquiries Office, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014. If a self-addressed gummed mailing label is enclosed in the request for kits, it will expedite handling.

Applicants are advised to contact the person designated in the area listing to discuss any questions, and especially if

(1) an application including predoctoral training is planned,
(2) compatibility between institutional and agency training aims is in doubt,
(3) questions arise as to waiver provision for the three-year limit on NRSA support.

Review and selection NRS grant applications will be evaluated by initial peer review groups at the NIH and are also subject to review and approval of the appropriate advisory council of the NIH whose activities relate to the research training proposed. The application will be evaluated on the basis of records and qualifications of participating faculty, the proposed research training objectives and program design, previous training record of the program and its ability to attract high caliber students, institutional commitment, facilities and environment, and relationship of the proposed program goals to need for research training in NIH program areas.

GENERAL PROVISIONS

Eligibility requirements Individuals appointed as trainees on the grant must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of appointment. A non-citizen national is a person who although not a citizen of the United States, owes permanent allegiance to the United States. They are generally persons born in lands which are not States, but which are under United States sovereignty, jurisdiction, or administration (e.g. American Samoa). Individuals on temporary or student visas are not eligible.

Predoctoral trainees must have received an appropriate baccalaureate degree as of the date of appointment to the approved training program. An individual at the postdoctoral level must have received as of the date of appointment to the approved training program, a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree.

Stipends and other training costs Stipends and allowances requested will be in accordance with the following: For predoctoral, an annual stipend of $3,900 for individuals at all levels.

For postdoctorals, the stipend for the first year is determined by the number of years of prior relevant postdoctoral experience at time of appointment. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree. The stipend for each additional year of support is based on the level for the first year plus $400 for each additional year under the National Research Service Award.

Tuition and travel may be requested. There is no allowance for dependents.

Postdoctoral Stipends

Years of Relevant Experience at Time of Initial Award	Year of Award		
	1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Stipend supplementation from non-Federal funds is permitted. Other Federal funds may be used for supplementation only if authorized by the program from which such funds are derived.

In addition to stipends, the institution may request tuition, fees (including appropriate medical insurance), and travel for trainees, actual indirect costs or 8% of allowable direct costs (whichever is less) and up to 25% of the total award for costs deemed essential to carry out the NRSA training program such as salaries, equipment, research supplies, staff travel, etc.

Period of Support Awards for institutional grants may be made for project periods of up to 5 years. However, no individual may receive more than three years of support in the aggregate from a National Research Service Award. Any exception to this requires a waiver from the Agency head based on review of justification from the trainee and the grantee institution.

Conditions of Award No trainee will be appointed unless a Statement of Appointment form and a signed Payback Agreement indicating his or her intent to meet the service or payback provisions required under the law have been submitted to NIH. Trainee appointments are made for full-time research training and research. Trainees may utilize some of their time in academic studies and clinical duties if such work is closely related to their research training experience.

A NRSA recipient may not hold another Federally sponsored fellowship or training award concurrently with a National Research Service Award. A research trainee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g. G.I. Bill) and loans from Federal funds.

Within two years after completion of NRSA support recipients of NRS Awards are to engage in biomedical or behavioral research or teaching or any combination thereof which is in accordance with usual patterns of academic employment for a period equal to the period of support. Alternatively, if the Secretary, DHEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in his or her specialty in a health maintenance organization serving a medically underserved population; (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives a NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives shall serve twenty months for each year of award.

For individuals who fail to fulfill their obligation through service, the United States is entitled to recover an amount equal to the total stipend received plus interest. The amount is computed in accordance with a formula which gives only one-half credit to each month of service when the total payback obligation is not completely fulfilled through service. Interest on the amount begins and is at the rate fixed by the Secretary of the Treasury considering private consumer rates which prevail on the date the United States becomes entitled to such amount. Payment must be completed within three years from that date.

By Federal Regulation, there are certain conditions under which the Secretary, HEW, may extend the period for undertaking service or for repayment, permit breaks in service, or to otherwise waive or suspend the payback obligation of an individual where enforcement of the obligation would involve extreme hardship or be against equity and good conscience.

Trainees are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the Spring, etc., and the short period between semesters or quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institution.

Taxability of Stipends NIH takes no position on the taxability or non-taxability of National Research Service Award stipends. Recipients of the NRS Award stipend are advised to consult local, State, and Federal revenue services.

Notification of Final Action The applicant will be notified by the awarding unit of the final action on the application by either an award notice or by a letter.

For additional information on the above program write: Office of Research Manpower, Division of Research Grants, National Institutes of Health, Bethesda, Maryland 20014.

The Alcohol, Drug Abuse, and Mental Health Administration and the Division of Nursing, Health Resources Administration, also provide support through National Research Service Awards. For information and application forms, contact the appropriate Agency.

For Institutional Awards Only

The research areas in which applications will be accepted for institutional awards are listed below by NIH awarding units. Applicants should contact the individuals designated for additional information, particularly when predoctoral training is contemplated.

National Institute on Aging

Awards may be for predoctoral and postdoctoral trainees or a combination of the two. Training may be for laboratory, clinical, or field research, and may be multidisciplinary. It may relate to:

1. The biology of aging, e.g. biophysical, biochemical, cellular, organ or organismic aging, the pathologic changes in aging experimental animals.
2. The special medical problems of aging and the aged, e.g. preventive medicine and aging, the aging nervous system, senile dementia, aging of the endocrine system, aging of connective tissue structures, pharmokinetics and pharmodynamics in the aged.
3. Psychological aspects of aging and the aged, e.g. cognitive, personality, and attitudinal changes with age.
4. Societal aspects of aging, e.g. population age-structure and its impact on economic, societal, and individual function, retirement, social aspects of aging in different cultures.

Dr. Walter Spieth (301) 496-1033

National Institute of Allergy and Infectious Diseases

1. Allergic and Immunologic Diseases and Basic Immune Mechanisms

   Allergy
   Immunology
   Immunopathology
   Immunogenetics
   Clinical Immunology
   Autoimmunity
   Transplantation Biology

2. Infectious Diseases and Basic Microbiological Mechanisms

   Bacteriology
   Virology
   Parasitology
   Mycology
   Pathogenesis of Infectious Diseases

3. Epidemiology of Allergic, Immunologic, and Infectious Diseases

Proposed institutional training programs may be multidisciplinary in nature.

Dr. Louis D. Bourgeois (301) 496-7820

National Institute of Arthritis, Metabolism, and Digestive Diseases

Provide opportunity for (1) the clinically-trained to acquire expertise in scientific research (e.g. biochemistry, biophysics, cell biology, epidemiology, genetics, physiology, or psychology), and (2) the scientifically-trained to obtain further training in biomedical research or clinical investigation relating to:

Arthritis, Bone, or Skin Diseases
Diabetes, Endocrine, or Metabolic Diseases
Digestive Diseases, Liver Diseases, or Nutrition
Kidney, Urologic, or Blood Diseases

Dr. Israel A. Goldberg (301) 496-7277

National Cancer Institute

The goal of the Cancer Research Manpower Development Program is to insure that an adequate number of highly competent basic and clinical cancer research specialists will be trained to meet needs in the following areas of research:

Cancer Etiology and Prevention
Cancer Detection and Diagnosis
Cancer Treatment and Restorative Care

Proposed institutional training programs may be multidisciplinary in nature.

Dr. Barney Lepovetsky (301) 496-7803

National Institute of Child Health and Human Development

Awards provide opportunities for research training in the biological and/or behavioral science aspects of the areas listed below. Primary concern in awarding institutional awards will be given to multidisciplinary or interdisciplinary programs which cannot be provided through individual fellowships. Although major concern is for postdoctoral training, predoctoral training will be considered where a special case for support can be justified.

Center for Research for Mothers and Children:

1. Problems of pregnancy, embryonic and fetal growth, labor and neonatal adaptation
2. Sudden infant death syndrome
3. Problems of cellular, tissue, and organ development, including developmental changes in immune response mechanisms
4. Congenital anomalities; structural, metabolic, and behavioral
5. Learning disorders, including dyslexia
6. Nutritional role of minor and trace elements in growth and development
7. Developmental impairments associated with aberrant absorption, transport, and metabolism of nutrients
8. Socioenvironmental influences on impact of poor nutritional status
9. Problems associated with changes in metabolism during development, including drug metabolism
10. Mental retardation
11. Adolescence, puberty, and problems of physical and behavioral development

Center for Population Research:

1. Fertilization and reproductive biology
2. Human population genetics
3. Reproductive hormones and reproductive diseases
4. Neuroendocrine control of reproductive processes

5. Fertility, fertility trends, demography, population change, movement, and distribution

6. Population policy

Dr. Gilbert L. Woodside (301) 496-1848

National Institute of Dental Research

*1. Behavioral Studies

*2. Cariology

3. Craniofacial Anomalies

4. Nutrition

5. Pain Control

6. Periodontal Diseases

7. Restorative Materials

8. Salivary Secretions

9. Soft Tissue Diseases

*Additional information sharply defining the type of training needed in this area is available on request. Potential applicants are urged to obtain information from the NIDR before submitting proposals.

Dr. Kenneth K. Hisaoka (301) 496-7658

National Institute of Environmental Health Sciences

1. Environmental Biology (Mutagenesis, Teratogenesis, Carcinogenesis)

2. Environmental Epidemiology and Statistics

3. Environmental Pathology-Pathophysiology

4. Environmental Toxicology

Dr. Christopher Schonwalder
(919) 549-8411, extension 3484

National Eye Institute

Laboratory and clinical research training related to vision and disorders of the visual system:

1. Retinal and Choroidal Diseases

2. Corneal Diseases

3. Cataract

4. Glaucoma

5. Sensory and Motor Disorders and Rehabilitation

Preference will be given to two-year research training programs in the following areas as they relate to the above:

1. Immunology

2. Genetics

3. Pharmacology

4. Epidemiology

5. Physiology

6. Biochemistry

7. Developmental Biology

8. Psychophysics and Physiological Optics

9. Pathology

Chief, Scientific Programs Branch
(301) 496-5301

National Institute of General Medical Sciences

For Predoctoral Training Grants:

1. Cellular and Molecular Biology
2. Genetics
3. Pharmacological Sciences
4. Systems and Integrative Biology
5. Medical Scientist Program

For Postdoctoral Training Grants:

1. Basic Pathobiology
2. Clinical Pharmacology
3. Genetics (with emphasis on Medical Genetics)
4. Trauma and Burn Research
5. Anesthesiology

Dr. Margaret Carlson (301) 496-7585

National Heart, Lung, and Blood Institute

1. Division of Heart and Vascular Diseases

The research training may be in fundamental studies of basic processes and functions, behavioral studies, or clinical investigations directed toward long-term involvement in research toward increasing our knowledge and understanding in cardiovascular areas related to our programs in:

Hypertension
Arteriosclerosis
Cardiovascular Aspects of Diabetes
Arrhythmias
Heart Failure and Shock
Cerebrovascular Disease
Peripheral Vascular Disease
Congenital and Rheumatic Heart Diseases
Cardiomyopathies and Infections of the Heart
Circulatory Assistance
Cardiovascular Devices and Technology

Dr. D. M. MacCanon (301) 496-1846

2. Division of Lung Diseases

The Division supports multidisciplinary research training in fundamental and clinical disciplines.

Training programs should be addressed to one or more of the following categories:

Structure and Function of the Lung
Pediatric Pulmonary Diseases
Emphysema and Chronic Bronchitis
Fibrotic and Immunologic Diseases
Respiratory Failure
Pulmonary Vascular Diseases
Epidemiology of Respiratory Diseases

Dr. John Abrell (301) 496-7668

3. Division of Blood Diseases and Resources

The Division seeks to support research training awards in the areas of:

Thrombosis
Hemostasis
Red Blood Cell Diseases
Sickle Cell Disease
Blood Resources
Blood Banking Sciences

Dr. Fann Harding (301) 496-5913

National Institute of Neurological and Communicative Disorders and Stroke

1. Developmental Neurology
2. Neurobiology
3. Neuroimmunology
4. Neuropathology and/or Otopathology
5. Neurovirology
6. Sensory Physiology and Biophysics
7. Minority Programs in Neurosciences

Dr. Raymond Summers (301) 496-9236

Division of Research Resources

Laboratory Animal Science and Medicine

Dr. John Holman (301) 496-5507

NIH Guide for Grants and Contracts
Vol. 6, No. 3, February 4, 1977

NATIONAL INSTITUTE OF
GENERAL MEDICAL SCIENCES

ANNOUNCEMENT

INSTITUTIONAL NATIONAL RESEARCH SERVICE AWARDS

The National Institute of General Medical Sciences is currently accepting applications from eligible institutions for support of highly selected, promising individuals who seek biomedical research training in the areas specified below.

It is the Institute's goal in the predoctoral programs to provide trainees broader access to thesis research opportunities across discipline and department lines while not sacrificing the standards of depth and creativity characteristic of the best Ph.D. programs. Cooperative involvement of faculty members from several departments as thesis research mentors is considered evidence for such breadth.

Programs for postdoctoral trainees should offer a wide range of research training opportunities. For individuals holding the Ph.D. degree, training should focus on advanced and specialized areas of research and offer appropriate opportunities to study clinical problems. For trainees holding a professional degree, at least two years of rigorous research training should be provided which is usually best accomplished in basic science departments.

The applicant is expected to present a detailed plan for the proposed training as well as criteria for trainee selection and mechanisms for quality control. The application should also give information on the qualifications of the proposed faculty participants, including their experience as trainors and their current research programs and support.

Separate applications for support of predoctoral and postdoctoral research training are required. In general, only one award in each of the ten areas listed below will be made to an institution. Further information regarding dates of application and notification, tenure, stipends, trainee eligibility, and required payback provisions may be found in the NIH Guide for Grants and Contracts, Vol. 6, No. 2, January 12, 1977.

For general information about these institutional NRS Award Programs, contact Dr. Margaret Carlson, Training Officer, National Institute of General Medical Sciences, Bethesda, Maryland 20014, telephone (301) 496-7585. Before preparing an application, applicants are strongly urged to contact the indicated staff member for the specific area.

NIGMS AREAS OF SUPPORT

Predoctoral Institutional National Research Service Awards

1. Cellular and Molecular Biology

   Programs should be of a cross-disciplinary nature and involve in-depth study of biological problems at the level of the cellular and molecular sciences. The research training offered should bring together components of at least two departments or Ph.D.-degree programs (such as anatomical sciences, biochemistry, biophysics, chemistry, developmental biology, genetics, immunology, microbiology, neurobiology, and pathology). Dr. Charles A. Miller - (301) 496-7021

2. Genetics

   Programs should emphasize the principles and mechanisms of genetics, with collaboration of faculty members representing a number of disciplines and research areas which may include chemistry, biochemistry, cell regulatory processes, population and behavioral aspects of heredity, and developmental biology. Dr. Dorothea S. Miller - (301) 496-7137

3. Pharmacological Sciences

   Training should emphasize the acquisition of competence in the broad fields of pharmacology and toxicology to conduct research on drug actions and effects in living cells, in animals, and in man—ranging from the chemical to the clinical level, with thesis research opportunities in such disciplines/departments as biochemistry, chemistry, genetics, medicinal chemistry, physiology, and the neuro- and behavioral sciences as well as in pharmacology. Dr. Sara A. Gardner - (301) 496-7181

4. Systems and Integrative Biology

   Research training should bring together components of varied resources and approaches of such disciplines/departments as physiology, bioengineering, biomathematics, nutrition, anatomical sciences, and the neuro- and behavioral sciences into combinations that will build the broad research competence required to investigate integrative and developmental functions of higher organisms and their organ systems. Dr. R. Burns Ross - (301) 496-7518

5. Medical Scientist Program

   Interdisciplinary programs of integrated medical and graduate research training required for investigation of diseases in man. These programs assure highly selected trainees a choice of a wide range of pertinent graduate programs in the biological, chemical, physical, and social sciences combined with training in medicine leading to the combined

M.D.-Ph.D. degree. The proposed program should be flexible and adaptable in providing each trainee with the appropriate background in the sciences relevant to medicine and be rigorous enough to enable the individual to function independently in both basic research and clinical investigations. Dr. Vincent Price - (301) 496-7563

Postdoctoral Institutional National Research Service Awards

1. Basic Pathobiology

Advanced interdisciplinary training for post-Ph.D.'s from basic biological, biochemical, and biophysical sciences for research on fundamental problems of human disease; and training, for individuals holding a professional degree, that provides an in-depth knowledge of the principles and methods required for research at the cellular and molecular level in normal and diseased states. Dr. Edward Hampp - (301) 496-7563

2. Genetics (with emphasis on Medical Genetics)

Advanced and special research training in genetics, utilizing and applying the principles and fundamental mechanisms of genetics toward an understanding of human genetic disease. Trainees may be drawn from diverse biological and medical backgrounds for research with faculty representing various approaches to genetic research--ranging from biochemical genetics to human population genetics. Opportunities for training in medical genetics are considered desirable. Dr. Dorothea S. Miller - (301) 496-7137

3. Clinical Pharmacology

Advanced research training in clinical pharmacology. Individuals should receive experience in the methodology and conduct of clinical research to qualify them to investigate, in depth, the effects and the mechanisms of drug actions in humans. Trainees, who would usually have the M.D. degree, should have the opportunity to acquire fundamental scientific knowledge and research techniques in areas such as basic pharmacology, biochemistry, physiology, analytical methodology, and other biomedical subdisciplines. Dr. Sara Gardner - (301) 496-7181

4. Trauma and Burn Research

Multidisciplinary research training for postdoctoral scientists to enhance their capability of advancing our knowledge of the body's complex reactions to trauma and burn injuries. The supervisory staff should include trauma surgeons and/or burn specialists as well as basic scientists. Emphasis will be placed on basic training for at least two years within such departments as physiology, biochemistry, immunology, and microbiology. Dr. Emilie Black - (301) 496-7373

5. Anesthesiology

Research training support is offered to individuals with the M.D. degree who seek a better understanding of the fundamental mechanisms of anesthesia and pain and their effects on the body at the level of the organ systems as well as at the cellular and molecular levels. In order to achieve these goals, it is expected that trainees will spend at least two years in such basic science departments as physiology, pharmacology or biochemistry. Dr. Emilie A. Black - (301) 496-7373

INDIVIDUAL POSTDOCTORAL NATIONAL RESEARCH SERVICE AWARDS

The National Institute of General Medical Sciences is currently accepting applications from eligible individuals who seek biomedical research training in the areas specified below.

Information regarding dates of application and notification, tenure, stipends, eligibility, and payback requirements may be found in the NIH Guide for Grants and Contracts, Vol. 6, No. 2, January 12, 1977.

For additional general information about the individual National Research Service Awards, contact Dr. Roger Fuson, Fellowships Officer, National Institute of General Medical Sciences, Bethesda, Maryland 20014, telephone (301) 496-7368. For information specific to the listed program areas, call the indicated staff member.

Postdoctoral individual National Research Service Awards may be applied for in the following areas:

1. Cellular and Molecular Biology

Awards are provided to enable individuals holding the Ph.D. degree in the biological or physical sciences to acquire special advanced research training toward developing necessary cross-field knowledge for a research career in cell sciences--in areas such as membrane structure and function, cell motility, differentiation, enzyme catalysis and regulation, and proteins and other macromolecules, which are essential for an understanding of living systems at the cellular-molecular level. The fellowships enable individuals holding the M.D. degree to obtain the requisite background and skills in basic research to bring new knowledge at the subcellular and molecular level into medicine. Dr. Charles A. Miller - (301) 496-7021

2. Genetics (including Medical Genetics)

Awards are made for research training focusing on the principles and mechanisms of genetics. The aim is the further understanding of genetic processes in general and of human genetic disease. Applicants may propose research and study with investigators representing various approaches to genetics including biochemical, developmental, regulatory, population and clinical aspects of heredity. Dr. George W. Woolley - (301) 496-7137

3. Pharmacological Sciences (including Clinical Pharmacology)

Training should emphasize the acquisition of competence in the broad research on drug action and effects on cells, animals, and man. Proposals from individuals with either a Ph.D. or a professional degree may range from the chemical to the clinical level of study and include training opportunities in such areas as biochemistry, physiology, medicinal chemistry, genetics, and other cognate fields. Dr. Raymond Bahor - (301) 496-7707

4. Systems and Integrative Biology (Physiology and Bioengineering)

Support for research training is offered to individuals holding a Ph.D. or professional degree who seek to apply engineering, physical and/or mathematical principles to biological and medical problems. Support is also available to individuals seeking competence in the quantitative study of organ systems and integrated physiological functions of animals and man. Dr. R. Burns Ross - (301) 496-7518

5. Clinically Oriented Areas

Research training support is offered (1) to individuals with the M.D. degree who are preparing for careers in clinical research; emphasis will be placed on proposals incorporating at least two years of training within such basic science departments as biochemistry, genetics, microbiology, immunology, physiology, pharmacology, psychology, or biostatistics; (2) to individuals with the Ph.D. degree who seek competence to apply the knowledge and methods of basic biomedical disciplines to medical problems, usually in close collaboration with clinical scientists. The following areas are represented:

Pathobiology - Dr. Edward Hampp (301) 496-7563
Anesthesiology - Dr. Emilie Black (301) 496-7373
Trauma and Burn Research - Dr. Emilie Black (301) 496-7373
Clinical Laboratory Sciences - Dr. Robert Melville (301) 496-7081
Behavioral Sciences Related to Medicine - Dr. William Taylor (301) 496-7048
Epidemiology - Dr. Margaret Carlson (301) 496-7585

In addition, the National Institute of General Medical Sciences offers individual National Research Service Awards under its Minority Access to Research Careers (MARC) Program. For information, contact Mr. Elward Bynum, Director, MARC Program, National Institute of General Medical Sciences, Bethesda, Maryland 20014 (301) 496-7357.

APPENDIX N3.1

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION
ROCKVILLE, MARYLAND 20852

OFFICE OF THE ADMINISTRATOR

ANNOUNCEMENT

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

National Research Service Awards for Individual Fellows

May 1977

Subject to availability of funds and to periodic modification of research areas, applications for individual fellowships will be accepted by ADAMHA under receipt dates of February 1, June 1, and October 1.

AUTHORITY AND PURPOSE: Under authority of Section 472 of the Public Health Service Act as amended (42 USC 2891-1), the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) provides National Research Service Awards to individuals for research training experiences in specified areas of biomedical and behavioral research. (See Attachment for description of these areas.) Title 42 of the Code of Federal Regulations, Part 66, is applicable to these awards.

LEVELS OF TRAINING: ADAMHA is redirecting the emphasis of support in its research training programs from predoctoral to postdoctoral support based on findings and recommendations from national manpower studies. While applications will be accepted for predoctoral or postdoctoral training, the highest priority will be given by ADAMHA to applicants for postdoctoral training.

ELIGIBILITY REQUIREMENTS: Applicants must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of application. Non-citizen nationals are persons born in lands which are not States, but which are under U.S. sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

A predoctoral applicant must have completed two or more years of graduate work as of the proposed activation date of the fellowship and have a doctoral prospectus. A postdoctoral applicant must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent degree as of the proposed activation date of the fellowship.

Applicants must propose research training in specified research areas (see Attachment). The program offers an opportunity to scientists, research clinicians, etc., to carry out supervised research in these areas, with the primary purpose of extending their skills and knowledge. National Research Service (NRS) Awards are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees, or for study which is part of residency training leading to a medical specialty.

Prior to formal submission, an applicant must arrange for appointment to an appropriate institution and acceptance by a sponsor who will supervise the research training experience. The institutional setting may be a domestic or foreign non-profit private or public institution (including ADAMHA or NIH) that has the staff and facilities to provide the proposed research training in a suitable environment.

With adequate justification, an individual may request support for research training abroad. Such applicants are required to provide detailed information on the unique facilities and/or training opportunity at the proposed location.

ANNUAL STIPENDS AND ALLOWANCES: The annual stipend for predoctoral individuals at all levels is $3,900.

For postdoctoral individuals the stipend for the first year is determined by the number of years of prior relevant postdoctoral experience at the time of award. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree. The stipend for each subsequent year is based on the level of the first year plus $400 for each additional year under a National Research Service Award.

Postdoctoral Stipends

Years of Relevant Postdoctoral Experience at Time of Award	YEAR OF AWARD		
	1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Institutions may supplement stipends as necessary from institutional resources. No ADAMHA grant funds may be used for supplementation. No supplementation may be provided from other Federal funds unless explicitly authorized under terms of the specific program from which such funds are received.

Funds will not be provided to cover the cost of travel between the fellow's place of residence and the training institution, except (1) the institution may authorize from the institutional allowance a one-way travel allowance in a case of extreme need or hardship; or, (2) the ADAMHA awarding component may authorize the cost of a single roundtrip economy or coach ticket to the training site when the approved training is at a foreign site or institution.

Upon request, ADAMHA will provide funds of up to $3,000 per 12-month period to the non-Federal sponsoring institution to help defray such trainee expenses as tuition and fees, research supplies, equipment, travel to scientific meetings, and related items. An allowance of up to $1,000 per 12-month period is available for the fellow sponsored by a Federal laboratory for scientific meeting travel expenses and appropriate medical insurance. When an individual award is for approved training involving research at sites other than the sponsoring institution, an allowance may be requested to help support field costs of the research as well as travel.

The sponsoring institution shall be entitled to the approved institutional allowance only upon official activation of the award. However, if an individual fellow is not enrolled or engaged in training for more than six months of the year of support for which the award was made, one-half of the allowance must be refunded to the Public Health Service.

PERIOD OF SUPPORT: No individual may receive more than three years of support in the aggregate under the National Research Service Award program. Any exception to this requires a waiver from the Director of the awarding Institute based on review of justification from the Awardee and his or her sponsor. Although fellowships are awarded for 12-month periods, assurances may be given by the awarding unit for continued support beyond the first year provided progress is satisfactory and funds are available.

ACTIVATION DATE: An awardee has until the end of twelve months from the issue date on the award notice to activate a new award.

CONDITIONS OF AWARD: No funds will be made available to an individual unless he or she has signed and submitted a Payback Agreement indicating his or her intent to meet payback provisions required under the law.

Within two years after completion of NRSA support, recipients of NRS Awards are to engage for a period equal to the period of support in biomedical or behavioral research or teaching or any combination thereof. When in academic employment, such research or teaching may be in any combination in accordance with the usual patterns of academic employment. Alternatively, if the Secretary, HEW, determines that there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or otherwise trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in his or her specialty in a health maintenance organization serving a medically underserved population; or (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives an NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Service Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation, the United States is entitled to recover an amount equal to the stipend received from the ADAMHA National Research Service Awards, plus interest. The amount is computed in accordance with a formula which gives one-half credit to months actually served. Interest on the amount begins and is at the rate fixed by the Secretary of the Treasury considering private consumer rates which prevail on the date the United States becomes entitled to such amount. Financial payback must be completed within three years from that date.

By Federal Regulation, there are certain conditions under which the Secretary, HEW, may extend the period for undertaking service or for financial payback, permit breaks in service, or otherwise waive or suspend the payback obligation to an individual where enforcement of the obligation would involve extreme hardship or would be against equity and good conscience.

Awards are made for full-time research training. Fellows may utilize some of their time in course studies and clinical duties if such work is closely related to and necessary for their research training experience.

An NRS Award recipient may not hold another federally sponsored fellowship concurrently with a National Research Service Award. An NRSA recipient may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds. Fellows are not entitled to vacations, as such, although fellows at academic institutions may take the holidays at Christmas, in the spring, etc., and the short period between semesters and quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at non-academic institutions are entitled to the normal holiday and vacation periods of the institutions.

REVIEW PROCESS AND REVIEW CRITERIA: Applications will be evaluated for scientific/technical merit by ADAMHA initial review groups and are also subject to the review and recommendations of the appropriate ADAMHA Advisory Council. The application will be evaluated on the basis of past academic and research records, the research training proposal, the sponsor's general qualifications, the training environment, the applicant's research goals in terms of specified priority areas, publications, reference reports and other relevant information.

FUNDING CRITERIA: Awarding components select applications for funding primarily on the basis of merit review results, but other factors which may be considered include availability of funds, priority on postdoctoral support, program priorities as indicated in the research areas specified in this announcement, and grants policy requirements.

APPLICATION RECEIPT AND REVIEW SCHEDULE:

Receipt Dates	Initial Review Group Meeting	Council Meeting	Earliest Possible Start Date
February 1	June	October	December 1
June 1	November	February	April 1
October 1	March	May	July 1

APPLICATION INFORMATION: Individuals are encouraged to review the eligibility criteria and specified research areas in this announcement before requesting application kits. The applicant must submit (1) an application (PHS 416-1), according to instructions provided by ADAMHA; (2) a signed assurance indicating that the service or financial payback requirement will be complied with, if an award is made; and (3) if a non-citizen, a notarized statement of permanent residence. A complete application also includes the sponsor's Facilities and Commitment Statement (PHS 416-2) which must be with the application at the time it is submitted. In addition, an applicant must arrange for the submission of reference reports (PHS 416-3) on his or her behalf. Application forms are to be submitted to the Division of Research Grants, 5333 Westbard Avenue, Bethesda, Maryland 20014.

An individual may not have more than one competing application pending review concurrently in the National Research Service Award program.

Requests for application forms and other inquiries regarding the ADAMHA National Research Service Awards for individual fellows should be addressed as follows:

General Mental Health:

Grants Management Officer
National Institute of Mental Health
5600 Fishers Lane
Rockville, Maryland 20857

Alcohol Abuse and Alcoholism:

Grants Management Officer
National Institute on Alcohol Abuse
and Alcoholism
5600 Fishers Lane
Rockville, Maryland 20857

Drug Abuse:

Grants Management Officer
National Institute on Drug Abuse
11400 Rockville Pike
Rockville, Maryland 20852

NOTIFICATION OF FINAL ACTION: An applicant is notified by the awarding unit of the final action on the application by an award notice or by a letter.

> The National Institutes of Health and the Health Resources Administration, Division of Nursing, also provide support through National Research Service Awards. For information and application forms, contact the appropriate agency.

APPENDIX N3.2

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION
ROCKVILLE, MARYLAND 20852

OFFICE OF THE ADMINISTRATOR

ANNOUNCEMENT

ALCOHOL, DRUG ABUSE, AND MENTAL HEATLH ADMINISTRATION

National Research Service Awards for Institutional Grants

May 1977

> *Subject to availability of funds and to periodic modification of research areas, applications for institutional research training grants will be accepted by ADAMHA under an annual receipt date of October 1.*

AUTHORITY AND PURPOSE: Under authority of Section 472 of the Public Health Service Act as amended (42 USC 289l-1), the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) will award grants to eligible institutions to develop or enhance research training opportunities for individuals selected by them who are training for careers in specified areas of biomedical and behavioral research. (See Attachment for description of these areas.) Title 42 of the Code of Federal Regulations, Part 66, is applicable to these awards.

LEVELS OF TRAINING: ADAMHA is redirecting the emphasis of support in its research training programs from predoctoral to postdoctoral support based on findings and recommendations from national manpower studies. While applications will be accepted for training of predoctoral and/or postdoctoral individuals, the highest priority for funding will be given to applications for postdoctoral training. Any request for support of predoctoral training must be accompanied by special justification in terms of manpower needs in the particular research area(s) to be encompassed by the proposed training program.

ELIGIBILITY REQUIREMENTS: Domestic public or non-profit private institutions may apply for institutional grants to support research training programs in areas of research specified in this announcement (see Attachment). The applicant institution must have, or be able to develop, the staff and facilities to provide the proposed research training in a suitable environment for performing high-quality work.

The training program director at the institution will be responsible for selection and appointment of individuals to receive National Research Service (NRS) Awards and for the overall direction of the research training program. The training program must provide opportunities for individual awardees selected by the institution to carry out supervised research in the specified areas with the primary objective of extending their skills and knowledge.

Individuals selected by the program director to be recipients of NRS Awards must be citizens or non-citizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at the time of appointment to the training program. Non-citizen nationals are persons born in lands which are not States, but which are under U.S. sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

Predoctoral individuals selected to receive NRS Awards must have completed two or more years of graduate work at the time of appointment to the NRSA training program. Postdoctoral individuals selected to receive NRS Awards must have received a Ph.D., M.D., D.D.S., D.O., D.V.M., O.D., Sc.D., D.Eng., D.N.S., or equivalent domestic or foreign degree as of the date of appointment to the NRSA training program. National Research Service Awards are not made for study leading to the M.D., D.O., D.D.S., or other similar professional degrees, or for study which is part of residency training leading to a medical specialty.

STIPENDS AND OTHER TRAINING COSTS: The annual stipend for predoctoral individuals at all levels is $3,900.

For postdoctoral individuals the stipend for the first year is determined by the number of years of prior relevant postdoctoral experience at the time of appointment. Relevant experience may include research experience (including industrial), teaching, internship, residency, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree. The stipend for each subsequent year of support is based on the level of the first year plus $400 for each additional year under a National Research Service Award.

Postdoctoral Stipends

Years of Relevant Postdoctoral Experience at Time of Award	YEAR OF AWARD		
	1st Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

Institutions may supplement stipends as necessary from institutional resources. No ADAMHA grant funds may be used for supplementation. No supplementation may be provided from other Federal funds unless explicitly authorized under terms of the specific program from which such funds are received.

In addition to stipends, the institution may request funds for tuition, fees and certain types of travel for trainees; actual indirect costs or 8% of allowable direct costs (whichever is less) to cover related institutional overhead; and up to 25% of the total award for other related costs (salaries, equipment, research supplies, etc.) which are deemed essential to carry out the program of training for the National Research Service Awardees appointed under the grant. Funds for such "other related costs" are intended to provide the institution with only partial support for the costs of developing or maintaining a high quality environment for the proposed research training and for meeting the costs of trainee research.

PERIOD OF SUPPORT: Awards for institutional grants may be made for project periods of up to five years. Individuals appointed under institutional grants to receive National Research Service Awards may not receive support for more than three years in the aggregate. Any exception to the three year limit requires a waiver from the Director of the awarding Institute based on review of justification from the awardee and the program director for the institutional grant.

CONDITIONS OF AWARD: No trainee will be appointed unless he or she meets the eligibility requirements, and unless a Statement of Appointment Form and a signed Payback Agreement (indicating the individual's intent to meet the service or payback provisions required under the law) have been submitted to ADAMHA.

Within two years after completion of NRSA support, individual recipients of NRS Awards are to engage, for a period equal to the period of support, in biomedical or behavioral research or teaching, or any combination thereof. When in academic employment, such research or teaching may be in any combination in accordance with the usual patterns of academic employment. Alternatively, if the Secretary, HEW, determines there are not suitable health research or teaching positions available to the individual, the following may be authorized: (1) If the individual is a physician, dentist, nurse, or other individual trained to provide health care directly to patients, the Secretary may authorize (a) service in the National Health Service Corps, (b) service in his or her specialty in a geographic area designated by the Secretary, or (c) service in his or her specialty in a health maintenance organization serving a medically underserved population; or, (2) If the individual who received the NRS Award is not trained to provide health care to patients, the Secretary may authorize the individual to engage in some other health-related activity. For each year for which an individual receives an NRS Award he or she shall (a) engage in twelve months of health research or teaching, (b) serve twelve months as a member of the National Health Services Corps, or (c) if authorized by the Secretary for one of the other alternatives, shall serve twenty months for each year of award.

For individuals who fail to fulfill their full service obligation, the United States is entitled to recover an amount equal to the total stipend received from the institutional grant, plus interest. The amount is computed in accordance with a formula which gives one-half credit to months actually served. Interest on the amount begins and is at the rate fixed by the Secretary of the Treasury considering private consumer rates which prevail on the date the United States becomes entitled to such amount. Financial payback must be completed within three years from that date.

By Federal Regulation, there are certain conditions under which the Secretary, HEW, may extend the period for undertaking service or for financial payback, permit breaks in service, or otherwise waive or suspend the payback obligation to an individual where enforcement of the obligation would involve extreme hardship or be against equity and good conscience.

National Research Service Awards provided to individuals under institutional grants are made for full-time research training. Awardees may utilize some of their time in course studies and clinical duties if such work is closely related to and necessary for the research training experience.

An NRS Award recipient may not hold another federally sponsored fellowship or training award concurrently with a National Research Service Award. An awardee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

REVIEW PROCESS AND REVIEW CRITERIA: Applications for institutional grants are evaluated for scientific/technical merit by ADAMHA initial review groups and also are subject to the review and recommendations of the appropriate ADAMHA Advisory Council. Applications will be evaluated on the basis of records and qualifications of participating faculty, the proposed research objectives and program design, the criteria to be employed in selecting individuals to receive NRS Awards, previous training record of the program and its ability to attract high caliber students, institutional commitments, facilities and environment, and relationship of the proposed program goals to need for research training in ADAMHA program areas.

FUNDING CRITERIA: Awarding components select applications for funding primarily on the basis of merit review results, but other factors which may be considered include availability of funds, priority on postdoctoral support, program priorities as indicated in the research areas specified in this announcement, and grants policy requirements.

APPLICATION RECEIPT AND REVIEW SCHEDULE:

Receipt Date	Initial Review Group Meeting	Council Meeting	Earliest Possible Start Date
October 1	March	May	July 1

APPLICATION: Eligible institutions desiring to request support under this program are encouraged to review the specified research areas (see Attachment). Application must be made on Form PHS 6025. Application forms are to be submitted to the Division of Research Grants, 5333 Westbard Avenue, Bethesda, Maryland 20014. Requests for application forms and other inquiries regarding the ADAMHA National Research Service Awards program should be addressed as follows:

General Mental Health:

Grants Management Officer
National Institute of Mental Health
5600 Fishers Lane
Rockville, Maryland 20857

Alcohol Abuse and Alcoholism:
Grants Management Officer
National Institute on Alcohol Abuse and Alcoholism
5600 Fishers Lane
Rockville, Maryland 20857

Drug Abuse:
Grants Management Officer
National Institute on Drug Abuse
11400 Rockville Pike
Rockville, Maryland 20852

NOTIFICATION OF FINAL ACTION: Applicants are notified by the awarding unit of the final action on the application by an award notice and/or by a letter.

> The National Institutes of Health and the Health Resources Administration, Division of Nursing, also provide support through National Research Service Awards. For information and application forms, contact the appropriate agency.

APPENDIX N3.3

May 1977

ATTACHMENT

ALCOHOL, DRUG ABUSE, AND MENTAL HEALTH ADMINISTRATION

National Research Service Awards Program
Research Areas for Individual and Institutional Awards

Research areas are described below in which the three Institutes of the Alcohol, Drug Abuse, and Mental Health Administration will offer awards. These areas are defined in terms of substantive and problem areas for which research manpower is needed, and examples are included of professions, disciplines, and approaches to be emphasized. Presentation of research areas is not in order of priority.

National Institute on Alcohol Abuse and Alcoholism

The research training efforts of the National Institute on Alcohol Abuse and Alcoholism are derived from the research program of the Institute which focuses on the multiple determinants of alcoholism and on the treatment and rehabilitation of alcoholics and alcohol abusers. Research training support may be obtained for the totality of research and disciplinary areas. At present, however, the highest priority for funding under the NRSA program is in social, behavioral, clinical, and treatment research training involving such disciplines as sociology, psychology, anthropology, epidemiology, health economics, and behavioral genetics. The specific foci of the program are indicated below.

1. Development of Behavior

Research training is needed to provide opportunities for study of developmental processes, e.g., those associated with adolescence and aging, as they may affect alcohol use and abuse. In addition, there is a need for study of genetic and social factors which may influence use of alcohol and development of alcohol problems.

2. Disorders and Maladaptive Behavior

The NIAAA emphasizes research training related to the problems of alcoholism and excessive alcohol usage, as well as to the means to prevent or limit the severity of these problems. Proposals are invited for research training in the etiology, diagnosis, pyschopathology, treatment, epidemiology, and the prevention of alcoholism and alcohol-related problems.

Eligible training proposals may be concerned with such issues as the differential diagnosis of alcoholism from other illnesses, especially the dividing line between chronic heavy drinking and alcoholism itself. Researchers are needed to study the natural history of alcoholism, patterns and trends in occurence of alcoholism, diseases in which alcohol may be a contributing factor, and the efficacy of new and standard treatments for various alcoholic populations.

3. Social Issues Relating to Alcoholism and Alcohol Problems

The NIAAA places high priority on minorities, youth, and women, and seeks research training applications related to these populations. Areas of interest include, for example, cultural patterns in use and abuse of alcohol and special service needs and problems of these populations.

In addition, NIAAA invites research training proposals related to the role of social gatekeepers, especially the courts and the police, in helping persons with alcoholism and alcohol-related problems.

Research training proposals may address legal, political science, and economic aspects of various social issues related to alcoholism, in addition to psychological and sociological aspects.

4. Services Research

There is a need for highly qualified researchers to develop and apply scientific methodology to problems connected with developing and improving delivery systems for alcoholism treatment, rehabilitation, and prevention services. Encouraged are applications focused on research training in: the determination of the effectiveness of various services in meeting the needs of particular populations and communities; epidemiologic techniques as applied to alcoholism service delivery systems, to elucidate, for example, the effects of social and economic factors on utilization of services; and methods for researching needs assessment and planning approaches, organization, staffing, management, and financing of alcoholism services as factors affecting, for example, the standards and quality of care, utilization, and cost effectiveness.

National Institute on Drug Abuse

1. Development of Behavior

Research training will emphasize the development of scientific expertise in behavioral pharmacology, molecular pharmacology, neuropharmacology, immunopharmacology, and endocrine pharmacology as these disciplines relate to mechanisms underlying the development of substance abuse behaviors. There is also a need to train scientific personnel for basic and applied research in the following areas: analytical chemistry, chemical synthesis, pharmacokinetics, and quantitative structure activity relationships. Additional expertise is needed in the areas of behavioral genetics and pharmacogenetics as they relate to the addictive process. Specialists are also sought in human personality formation, psychological development, the socialization process, and their interrelationships with addictive life styles.

2. Disorders and Maladaptive Behavior

There is a need to develop research expertise on complex behavioral and societal factors involved in the etiology and epidemiology of drug abuse and related maladaptive behavior. Emphasis will be placed on providing interdisciplinary training and training of behavioral and social scientists in experimental and field analysis of social behavior. Particular emphasis is placed on training of behavioral and social scientists who have an interest in research on substance abuse and its sequelae and analyzing life style factors in clinical and naturalistic settings. Experimental and methodological expertise is needed to develop new measures of incidence, prevalence, and usage patterns of abuse substances. Training also is needed to enable scientists to assess the safety and efficacy of new pharmacological and innovative behavioral treatment modalities and to develop and assess, within both clinical and naturalistic settings, new modalities for treating drug and substance abuse behavior among various population groups. Emphasis will be given to extending research methodological skills of clinicians in the fields of pharmacology, behavioral pharmacology, and treatment of substance abuse.

3. Social Issues Relating to Alcohol, Drug Abuse, and Mental Health

Applications for training are encouraged with respect to variations in drug abuse problems among special population groups at risk. Emphasis will be on interdisciplinary research training for social, psychological, and medical scientists. Trained personnel are also needed to conduct research employing anthropological methods for the study of drug use and abuse in different cultures and groups.

4. Services Research

Training is needed for social and behavioral scientists to design and execute evaluations of current programs of treatment or prevention.

National Institute of Mental Health

The research objective of NIMH is to better understand the determinants of human behavior particularly relevant to mental illness and mental health. Highly trained researchers are required to produce the new knowledge that is needed. Manpower needs in research related to mental health problems are in four general areas: (1) the processes underlying the development and variation of behavior; (2) mental disorders and maladaptive behavior; (3) social problems related to mental health; and (4) mental health services research. Support is available in these areas as they are relevant to the NIMH mission.

1. Development of Behavior

As behavior is determined by biological, psychological, and sociocultural factors, proposals will be accepted for research training in disciplinary or interdisciplinary settings concerned with these determinants. The development and maintenance of mental health throughout the entire lifespan of the individual is of concern, with special focus on childhood, adolescence, and old age.

Applications concerned with such areas as behavioral genetics, psychobiological aspects of maturation, sensory and motor processes, affective and cognitive processes, and biological bases of social behavior and social organization are eligible for support. The influence of psychotropic drugs on these processes and the mechanisms of action are of special concern to NIMH. Proposals will be considered also in such areas as development of the brain and the central nervous system, at all levels of organization, as they relate to behavior.

Proposals are also invited in the areas of social and cognitive development, perception, memory, and language, particularly as they relate to personality research. Other relevant topics include cultural norms of behavior, social structure, social interaction, socio-cultural factors of change and stress, human adaptation, socialization, family dynamics, and in general the effects of socio-cultural environment on the developmental processes of persons, families, and groups. Processes involving adaptive or "normal" behavior are as much of concern as those involving maladaptive or "abnormal" behavior.

2. Mental Disorders and Maladaptive Behavior

The mission of the NIMH includes concern for both mental health and mental illness. Proposals are invited for research training in the etiology, diagnosis, psychopathology, treatment, epidemiology, and the prevention of mental disorders and maladaptive behavior in homogeneous and heterogeneous cultural settings.

Eligible training proposals may be concerned with organic and functional disorders involving the nervous system and behavior in general. Areas of special importance are child mental health, schizophrenia, depression and suicide, psychosomatic disorders, and psychoneuroses. Applications are invited for research training to identify life events associated with risk populations and the genetics of mental disorders. Of particular interest is training which combines basic biological, psychological, or socio-cultural research with clinical research training in mental disorders and maladaptive behavior. Research training concerned with measurement in the community of dimensions and distribution of mental disorders in terms of incidence, prevalence, and mortality, and an understanding of the factors associated with differential distribution is encouraged.

3. Social Problems Related to Mental Health

Applications are sought for research training in several social problem areas as they relate to mental health: (1) understanding crime and delinquency, individual violence, and law/mental health interactions, and evaluating community-based treatment programs for offenders; (2) understanding the relationship between the conditions of urban life, the functioning of communities and families, and the well-being and mental health of the individual; problem areas of special interest are the work situation, economic change, informal helping networks and alternative social forms; (3) understanding minority group concerns including their interest in mental health services, research on planning for the improvement of such services to minority groups, and understanding institutional racism and evaluating intervention programs to alleviate it; and (4) understanding the social and other conditions which encourage sexual attacks; the impact of rape on the victim and the family of the victim; evaluating the effectiveness of laws to prevent and control rape; evaluating the effectiveness of programs to assist the victim and the family of the victim, and programs to treat offenders.

Training in the area of social problems research is often multidisciplinary in nature. It covers a broad range of research problems, including basic studies of human behavior, intervention studies concerned with meeting special human needs, and studies on the overall improvement of mental health and social systems. Such problems can be addressed from the level of individual behavior and needs on the one hand, to the level of social institutions and their interactions on the other hand.

4. Mental Health Services Research

A major task for the research community is the development of a pool of highly qualified researchers trained to develop, apply, and refine appropriate scientific methodologies for the study of problems related to the delivery of mental health services.

Accordingly, applications are sought for research training proposals designed to strengthen and expand the capabilities of researchers for work on theoretical and methodological problems in this area.

Encouraged are applications focused on training in: epidemiologic techniques as applied to mental health service systems, to elucidate, for example, the effects of social and economic factors on utilization of services; methods for researching needs assessment and planning approaches, organization, staffing, management, and financing of mental health services as factors affecting, for example, the standards and quality of care, utilization and cost effectiveness; and methods for evaluating the effectiveness of various services in meeting the needs of particular populations or communities.

Each of the four general areas described above requires mobilization of both disciplinary and interdisciplinary approaches. In essence, the NIMH research training programs support research training in disciplines and substantive areas representing three disciplinary clusters as they address problems and priorities of concern to its mission which are discussed above:

Biological Sciences
Psychological Sciences
Social Sciences

Biological Sciences:

This area consists primarily of:

- Behavioral Genetics
- Biological Anthropology
- Neurobehavioral Sciences
  - Neuroanatomy
  - Neurophysiology
  - Neuropsychology
  - Neuroendocrinology
  - Neurochemistry
- Psycho-Neuropharmacology
- Ethology

Psychological Sciences:

This cluster consists of:

- Child and Developmental (life span)
- Social, Environmental, and Ecological
- Sensory Processes, Perception, and Cognition
- Human Learning and Performance
- Comparative, Ethological, and Animal Behavior
- Physiological and Biopsychology
- Experimental Psychopathology and Personality
- Evaluation Research Methodology

Social Sciences:

This area consists primarily of:

- Cultural Anthropology
- Sociology and Social Psychology
- Economics
- Political Sciences
- Epidemiology

Clinical Investigators

Research training support is available for clinical investigators in the disciplines and substantive areas described above. Clinical investigators are those individuals with a doctoral or equivalent professional degree in a clinical health profession (such as medicine, clinical psychology, nursing, or social work) who are trained to conduct biological, psychological or social science investigations.

APPENDIX N4

NATIONAL RESEARCH SERVICE AWARDS for INDIVIDUAL PREDOCTORAL and POSTDOCTORAL NURSE FELLOWSHIPS

HEALTH MANPOWER REFERENCES

JULY 1976

DHEW Publication No. (HRA) 76-76

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE ■ HEALTH RESOURCES ADMINISTRATION
BUREAU OF HEALTH MANPOWER ■ DIVISION OF NURSING
BETHESDA, MARYLAND 20014

NATIONAL RESEARCH SERVICE AWARDS FOR INDIVIDUAL PREDOCTORAL AND POSTDOCTORAL NURSE FELLOWSHIPS

ANNOUNCEMENT

Under authority of Section 472 of the Public Health Service Act, as amended (42 USC 4821-1), the Division of Nursing provices National Research Service Awards (NRSA) to nurses for predoctoral and postdoctoral training in specified areas of nursing and in biomedical and behavioral fields important to nursing (see list, page 7).

Awards are made to individual applicants, selected in national competition for specified research training. Such awards are contingent upon the availability of funds, and follow the regulations for National Research Service Awards established by the Public Health Service and published in the Federal Register (Code of Federal Regulations, Title 42, Part 66).

PAYBACK OR SERVICE PROVISIONS

The National Research Service Award Act of 1974 requires satisfactory assurance that a fellow will meet service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted. No funds will be available to a recipient unless he or she has signed and submitted the Payback Agreement to meet the service and/or payback provisions required under the law.

PURPOSE

The purpose of the predoctoral and postdoctoral nurse fellowship program is to provide support for doctoral training of professional nurses. Support of qualified nurses for doctoral study will (1) increase the opportunities for professional nurses to engage in full-time graduate study and research training; (2) prepare professional nurses to conduct independent research, collaborate in interdisciplinary research, and stimulate and guide others in nursing research, (3) promote the availability and utilization of nurses with research training in nursing and/or the basic sciences to function as faculty in schools of nursing at undergraduate and graduate levels; and (4) prepare nurses to conduct scientific inquiry in disciplines that have significance for nursing theory and practice.

ELIGIBILITY REQUIREMENTS

Applicants must be citizens or noncitizen nationals of the United States, or have been lawfully admitted to the United States for permanent residence and have in their possession a permanent visa at time of application. Noncitizen nationals are persons who, although not citizens of the United States, owe permanent allegiance to the United States. They are generally persons born in lands which are not States, but which are under United States sovereignty, jurisdiction, or administration (e.g., American Samoa). Individuals on temporary or student visas are not eligible.

Applicants must be registered professional nurses with either a baccalaureate degree in nursing and/or a master's degree in nursing. Applicants for postdoctoral study must have received a Ph.D., D.N.S., Sc.D., or equivalent degree prior to the beginning date of the proposed fellowship. National Research Service Awards are not made for study leading to a degree in law or to the M.D., D.O., D.D.S., or other similar professional degrees.

Prior to formal submission of the NRSA application, a nurse applicant must have been admitted by a sponsoring institution and accepted by a faculty sponsor who will supervise the applicant's training and research experience. The institution setting may be a domestic nonprofit private or public institution, including Federal laboratories. The application must document the availability of staff and facilities to provide a suitable environment for performing high quality work. The major emphasis of the application should be the research training experience and broadening of scientific competence.

Applicants must apply in one of the areas specified by the Division of Nursing (see list, page 7). Proposed study must encompass either nursing, biomedical, or behavioral research training with an opportunity to carry out supervised research in the specified areas, to broaden the applicant's scientific background, and to extend potential for research in health-related areas.

DOCUMENTS TO BE SUBMITTED

The applicant must submit (1) an application (PHS-416-1), (2) a signed assurance that the service or payback requirement will be complied with, if an award is made, and (3) if a noncitizen, a notarized statement of permanent residence. A *complete* application includes the sponsor's Facilities and Commitment Statement (PHS-416-2), *which must be with the application when submitted*. The following supporting documents which are also required need not accompany the complete application, but the applicant must arrange for the submission of these documents at the designated time given in the application: reference reports (PHS-416-3) on his or her behalf; letter of admission to the university; transcripts and GRE verification; and reprints of recent publications.

An individual may not have more than one competing application pending review concurrently in the NRSA program.

APPLICATION MATERIAL

Individuals are encouraged to review the eligibility criteria before requesting application kits from the Nursing Research Branch of the Division of Nursing, Bureau of Health Manpower, Health Resources Administration, 9000 Rockville Pike, Bethesda, Maryland 20014. If a self-addressed gummed mailing label is enclosed in the request for kits, it will expedite handling.

Applications Received by	Results Announced
October 1	February
February 1	July

ANNUAL STIPENDS AND ALLOWANCES

The annual stipend for predoctoral individuals at all levels is $3,900. The stipend level for the first year for postdoctoral individuals is determined by the number of years of prior relevant postdoctoral experience at the time of award. Relevant experience may include teaching, research experience (including industrial), clinical and/or administrative nursing, or other time spent in full-time pursuit of additional degrees or full-time studies in a health-related field at a level beyond that of the qualifying doctoral degree. The stipend for each additional year of support is based on the level of the first year plus $400 for each additional year under the NRSA.

POSTDOCTORAL STIPENDS

Years of Relevant Experience at Time of Initial Award	Ist Year	2nd Year	3rd Year
0	$10,000	$10,400	$10,800
1	10,800	11,200	11,600
2	11,500	11,900	12,300
3	12,200	12,600	13,000
4	12,800	13,200	13,600
5 or more	13,200	13,600	14,000

SUPPLEMENTATION OF STIPENDS

Stipend supplementation from non-Federal funds will be permitted. Other Federal funds may be used for supplementation only if authorized by the program from which such funds are derived.

ALLOWANCE FOR DEPENDENTS

An allowance is not provided for dependents.

ALLOWANCE FOR TRAVEL

An allowance is not provided for the cost of travel between the applicant's place of residence and the training institution.

ALLOWANCE FOR THE SPONSORING INSTITUTION

The non-Federal sponsoring institution, upon request, will be provided with funds of up to $3,000 per 12-month period to defray such expenses as tuition and fees, research supplies, equipment, appropriate medical insurance, travel to scientific meetings, and related items for predoctoral and postdoctoral individuals. When the sponsoring institution is a Federal laboratory, an allowance of $1,000 is available for the postdoctoral individual to cover the cost of appropriate health insurance and travel to scientific meetings.

PERIOD OF SUPPORT

No individual may receive more than 3 years of support in the aggregate under a NRSA. Any exception to this requires a waiver from the Agency head based on review of justification from the applicant and sponsor. Although fellowships are awarded for a 12-month period, assurances may be given by the awarding unit for continued support beyond the first year, provided progress is satisfactory and funds are available.

SELECTION OF AWARDEES

Applications will be evaluated by initial scientific review groups and are also subject to review and action by the National Advisory Council on Nurse Training. The applications will be evaluated on the basis of past academic and research records, the research training proposal, the sponsor and training environment, the applicant's research goals, publications, reference reports, and other relevant information. Division of Nursing program interests and the availability of funds are also considered in the final selection.

NOTIFICATION OF FINAL ACTION

An applicant is notified by the awarding unit of the final action on the application by letter.

ACTIVATION DATE

An awardee has until the end of 12 months from the issue date on the award notice to activate a new award.

CONDITIONS OF AWARD

A. Payback or Service Agreement

No award will be made to an individual unless he or she has signed and submitted the Payback Agreement indicating his or her intent to meet the service or payback provisions required under the law as a condition under which a National Research Service Award is made and accepted.

B. The Service or Payback Provisions

Within 2 years after completion of the NRSA support, recipients of NRS Awards are to engage in continuous nursing research, or biomedical or behavioral research basic to nursing, or teaching, or any combination thereof which is in accordance with usual patterns of academic employment, for a period equal to the period of support. Alternatively, if the Secretary, HEW, determines there are no suitable health research or teaching positions available to the individual, the following may be authorized: (1) service in the National Health Service Corps, (2) service in his or her speciality in a geographic area designated by the Secretary, or (3) service in his or her speciality in a health maintenance organization serving a medically underserved population. For each year for which an individual receives a NRS Award he or she shall (1) engage in 12 months of health research or teaching, (2) serve 12 months as a member of the National Health Service Corps, or (3) if authorized by the Secretary for one of the other alternatives, shall serve 20 months for each year of award.

For individuals who fail to fulfill their obligation through service, the United States is entitled to recover an amount equal to the total stipend received from the Division of Nursing, plus interest. This amount is computed in accordance with a formula which gives only one-half credit to each month of service when the total payback obligation is not completely fulfilled through service. Interest on the amount begins, and is at the rate fixed by the Secretary of the Treasury considering private consumer rates which prevail, on the date the United States becomes entitled to such amount. Payback must be completed within 3 years from that date.

By Federal regulation, there are certain conditions under which the Secretary, HEW, may extend the period for undertaking service or for repayment, permit breaks in service, or to otherwise waive or suspend the payback obligation of an individual where enforcement of the obligation would involve extreme hardship or be against equity and good conscience.

FULL-TIME STUDY PROVISIONS

NRS Awards are awarded to applicants for full-time predoctoral and/or postdoctoral study. Applicants engaged in postdoctoral study may utilize some of their time in academic studies and clinical duties if such work is closely related to their research training experience.

CONCURRENT BENEFITS

A NRSA recipient may not hold another Federally sponsored fellowship concurrently with a National Research Service Award. A research trainee may, however, accept concurrent educational remuneration from the Veterans Administration (e.g., G.I. Bill) and loans from Federal funds.

VACATION PERIOD

Recipients of NRSA are not entitled to vacations, as such, although those at academic institutions may take the holidays at Christmas, in the spring, etc., and the short period between semesters or quarters. The time between a summer session and a fall semester is considered an active part of the training period. Those at nonacademic institutions are entitled to the normal holiday and vacation periods of the institution.

TAXABILITY OF STIPENDS

The awarding unit takes no position on the taxability or nontaxability of NRS Awards. No deductions for income tax or social security are withheld by the awarding unit and no annual summary of amounts paid to the fellow are provided. Recipients of the NRSA are advised to consult local, State, and Federal revenue services.

APPLICATION INFORMATION

Requests for application forms and other inquiries regarding the Division of Nursing Predoctoral and Postdoctoral National Research Service Award Program should be address as follows:

Nursing Research Branch
Division of Nursing, BHM, HRA
Federal Building, Room 6A08
9000 Rockville Pike
Bethesda, Maryland 20014

MAJOR FIELDS OR COMBINATIONS THEREOF FOR PREDOCTORAL AND POSTDOCTORAL STUDY FOR SUPPORT WITH NATIONAL RESEARCH SERVICE AWARDS

The Division of Nursing's research training program supports research training in disciplines and substantive areas representing Nursing, the Physical and Biological Sciences, Social and Behavioral Sciences, Community Health and Health Services, and Bioethics as they address problems and priorities of concern to nursing. Other fields are included as appropriate for multidisciplinary training.

Nursing

Physical and Biological Sciences

- Anatomy
- Biochemistry
- Bioengineering
- Biology
- Genetics
- Microbiology
- Nutrition
- Physics
- Physiology

Social and Behavioral Sciences

- Anthropology
- Health Economics
- Human Ecology
- Psychology
- Psychometrics
- Social Biology
- Social Psychology
- Sociology

Community Health and Health Services

- Biostatistics
- Epidemiology
- Health Education
- Health Services Administration
- Mental Health
- Public Health Administration

Bioethics

Other Fields

- Communication
- Computer and Information Science
- Educational Administration
- Educational Psychology
- Educational Technology
- Higher Education
- History and Philosophy
- Human Growth and Development
- Operations Research and Systems Analysis